STREET
PAVEMENT FOR RUSHVILLE, ILLINOIS

BY

J. POMERENE
M. J. FLEMING
H. E. JEDAMSKE

ARMOUR INSTITUTE OF TECHNOLOGY

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STREET PAVEMENT
for
RUSHVILLE, ILLINOIS

A THESIS

Presented by

JOEL POMERENE

MATTHEW J. FLEMING

HERBERT E. JEDAMSKE

To The

PRESIDENT AND FACULTY

Of

ARMOUR INSTITUTE OF TECHNOLOGY

For The Degree Of

BACHELOR OF SCIENCE IN CIVIL ENGINEERING

Having Completed The Prescribed

Course Of Study In

CIVIL ENGINEERING.

1914.

Approved

Alfred E. Phillips
Prof. Civil Eng.

H. M. Raymond

L. C. Monin.

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Preface.

The last few years have been marked by very rapid growth of popular sentiment in favor of improved roads. While it is a lamentable fact that some communities feel that improvement means only a little scraping and dragging, the more progressive and far sighted communities realize that pavement of some degree of permanance is the only good policy in improving roads. The degree of permanance possessed by a given pavement is often the main or at least one of the main qualities for which it is picked.

Among the many different kinds of pavement available there are two general classes which seem to merit particular attention and which are growing in public favor. These two classes are brick and bitulithic pavements. For almost any class of work out side of large cities one or the other of these two pavements will be found better suited to the requirements than any other. In large cities, streets carrying

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exceedingly heavy traffic are usually paved with granite blocks, but even here there is a growing sentiment in favor of asphalt or other bitulithic pavement.

In view of the above facts it was thought that a work including the best practice in the design of brick and bitulithic pavements and the estimation of cost and specifications for the same would be both timely and acceptable. Therefore the following work was.undertaken.

This work includes everything mentioned above and is the complete engineers work. on "Pavements for the City of Rushville" from the initial survey up to the letting of the contract.

A THESIS:

PLANS AND SPECIFICATIONS AND ESTIMATE OF COST FOR BRICK AND CONCRETE PAVEMENTS FOR THE CITY OF RUSHVILLE,ILLINOIS.

The work contemplated under these specifications and the lines between which,paving is to be laid,is shown upon the plat and upon plans accompanying these specifications.

The estimate of the work to be done and upon which the bids will be compared is as follows:

Excavation.	5805.9	Square yards.
Combined curb and gutter.	11520.00	Lineal feet.
Concrete curb.	2158.00	Lineal feet.
False curb.	2721.00	Lineal feet.
Circular combined curb and gutter.	411.00	Lineal feet.
Circular false curb.	81.90	Lineal feet.
Marginal curb.	842.00	Lineal feet.
Brick pavement.	21468.38	Square yards.
Concrete pavement.	2921.50	Square yards.
Vitrified drain tile.	12313.96	Lineal feet.
36 inch reinforced concrete pipe.	73.00	Lineal feet
30 inch reinforced concrete pipe.	82.00	Lineal feet.
24 inch reinforced concrete pipe.	60.00	Lineal feet.

These quantities are considered to br closely approximate only, and any variation from them will not entitle the contractor to any claim for extra time in the completion of the work,or toany other claim for damages if the quantities of work shall prove to be greater or less than here estimated.

Grading.

The street,including the approaches thereto,is to be graded to such grades,sub-grades and cross-sections as the engineer shall direct, the finished sub-grade of the roadway to conform to the proper con-

tour of the finished pavement,as shown by the plans on file.

The price bid for excavation is to include all refilling that may be necessary in order to bring the low places in the street to grade. Where filling is necessary in order to bring the low places to grade,it shall be made in layers of not more than six(6) inches in thickness,each layer well dampened,and either tamped with a tamper having an area of not more than twelve(12) square inches, and weighing not less than ninety(90)pounds,or rolled with a roller weighing not less than five(5)tons and not more than eight(8) tons.

In places where excavation is necessary in order to bring the street to the required grade,no plow or scraper shall be used below a line two(2)inches above the surface to which the street is to be graded.

The roadbed shall then be brought to the exact sub-grade by rolling with the roller described above. ALL hollows and depressions that may appear after this rolling,shall be brought to subgrade by refilling with gravel thoroughly tamped or rolled,for which no extra compensation will be allowed.

Should the earth of the last two inches above the sub-grade prove too hard to be compressed by the roller as described above, then the remaining material may be loosened with picks and removed with shovels or scraper and the sub-grade finally rolled with above described roller.

All mud,or other soft or spongy material,or other material that cannot be made solid or compact in the roadbed,shall be re-

moved and the places filled with gravel,thoroughly rolled,for which no extra compensation will be allowed.

All excavated material not otherwise used in this work,shall be used to fill the side ditches and any such material remaining, shall be the property of the City and shall be deposited in such places as the engineer may direct,provided the maximum haul shall not exceed one-half mile.

After the roadbed has been rolled for the pavement foundation, no loaded or empty wagons or other vehicles that might disturb the finished surface will be permitted thereon,unless the roadbed is protected with a covering of planks.

No work of grading shall be done on any part of the roadway until the paving material to be used shall have been distributed along the line of the street in sufficient quantities to fully complete the work for the full length of the roadway to be disturbed. The contractor will notify the engineer when he is ready to begin grading upon any work in advance of the paving,but not more than two squares shall be torn up in advance of the paving.

The contractor will notify the engineer when he is ready to begin the work of construction of the concrete foundation,and no further work shall be done upon that section until the sub-grade has been carefully examined and accepted by the engineer.

The contractor will furnish all assistance,grade stakes,templets,and whatever else may be necessary to properly lay out the hrade lines and cross-sections of the street.

All grading will be paid for by the cubic yard at the price

named in the contract,and will be measured in excavation only. The contract price per cubic yard shall include all trimmimg,refilling and other work and all materials necessary to bring the completed surface of the roadbed to the exact shape and grade required by the plans and specifications.

MATERIALS.

Gravel.

Gravel used in the concrete must be clean,and free from clay, loam or other dirt,and must contain not more than twenty(20)per cent of voids. It shall contain no stones larger than one and one-half(1½)inches in their largest dimension,and must be screened and if necessary washed,before being brought upon the work.

Sand.

The sand for the concrete must be clean,free from pebbles, loam or other vegetable matter,sharp,and not too fine.

The sand for the cushion of the brick pavement must be clean, free from pebbles,loam or other vegetable matter,preferably sharp, and of such size as to readily pass through a quarter(¼)inch mesh.

Stone.

The broken stone used for the concrete shall be of the best quality of hard limestone,trap rock or granite, It shall be free from mud,dirt,dust,loam or other objectionable matter. It shall be screened when necessary,on an one-half(½)inch screen to eliminate all dust and small particles. It shall be broken so as to pass through an one and one-half(1½)inch ring and must be broken before

being delivered upon the work; in no case will the stone be allowed to be delivered upon the street and there broken.

Cement.

All cement to be used in connection with this improvement shall be of the best quality of Portland cement. Whatever the brand, it shall be subject to inspection, and must conform to the standard taests of the American Society for Testing Materials. The contractor shall furnish samples for inspection and tests whenever called upon to do so, and shall defray all expenses involved in such tests. All rejected cement shall be immediately removed from the work. The cement shall be delivered upon the work in proper packages with the manufacturer's name thereon.

It shall be incumbent upon the contractor to properly care for the cement both before and after inspection. It shall be stored in a dry place, and only enough delivered at any one time, upon the line of work, to meet the requirements of the work. During showers, it shall be properly covered with tarpaulins.

Paving Brick.

The brick used for the wearing surface shall be straight as possible, regular in size and shape and free from flaws and with but slight laminations. They shall be made expressly for paving purposes and shall be hard and tough, thoroughly vitrified, and must fulfill the following requirements:

The brick shall measure not less than 2½ x 4 x 8 inches, nor more than 3¾ x 4 x 9½ inches, and shall not absorb more than four(4) per cent of their weight of water after being broken and immersed for forty eight(48)hours.

The engineer may require that the brick be subjected to tests for transverse strength and also to abrasion tests,and when so tested,the brick shall be tested in manner and method and with a rattler,together with a record thereof,as adopted by the National Paving Brick Manufacturer's Association at their annual meeting of 1911.

After the brick bid upon and accepted for use in the pavement have been delivered upon the work,samples for testing will,be taken from each block or part block,such samples to be,as nearly as may be obtained,the average of all the bricks in that block or part block. These bricks will be subjected to the tests above specified, and if they do not fulfill all requirements,all of the bricks in that portion of the work represented by the samples will be rejected and such rejected bricks must be immediarely removed from the work. The contractor must provide every facility and defray all expenses involved in the proper testing of the material.

The bidders shall submit samples of the bricks which they bid upon and which they propose to use in the construction of the work, and no proposal will be considered that is not accompanied by at least six(6)samples of the brick bid upon.

If the bricks are provided with lugs or raised letters on the side,such lugs or letters are not to exceed one-eighth($\frac{1}{8}$)of an inch in depth.

Making and Laying the Concrete base.

Portland cement.

See specifications for cement on page 5 of these specifications.

Fine aggregate.

Fine aggregate shall consist of sand,crushed stone or gravel screenings,graded from fine to coarse,and passing when dry,a screen of one-quarter inch mesh. It shall be preferably of siliceous material,free from soft particles and dust,both loose and occurring as a coating on the grains,free from loam,vegetable or other deleterious material: and not more than three per cent shall pass a sieve having 100 meshes per lineal inch. Fine aggregate shall be of such quality that mortar composed of one part of Portland cement and three parts fine aggregate,by weight,when made into briquettes,will shaow a tendile strength at least equal to the strength of 1 : 3 mortar of the same consistency,made with the same cement and standard Ottawa sand. In no case shall fine aggregate containing frost or lumps of frozen material be used.

Coarse aggregate.

Coarse aggregate shall consist of inert materials,such as broken stone,or gravel,graded in size,retained on a screen of one-quarter($\frac{1}{4}$)inch mesh,and passing a screen of one and one-half($1\frac{1}{2}$) inch mesh. It shall be clean,hard,durable,and free from all deleterious matter and shall contain no soft,flat or elongated particles. In no case shall coarse aggregate containing frost or lumpd of frozen material be used.

Naturak mixed aggregates.

Natural mixed aggregate shall not be used as they come from deposits,but shall be screened and remixed to conform with the proportions specified.

Water.

Water shall be clean,free from oil,acid,alkali or other vegetable material.

MEASURING AND MIXING.

Measuring.

The fine aggregate and the coarse aggregate shall be measured in suitable bottomless measuring-boxes or by equally accurate measuring devices. A bag of Portland cement,of ninety-four(94)pounds net weight,shall be considered one cubic foot.

Machine mixing.

A batch mixed shall be used. The ingredients of the concrete shall be mixed to the desired consistency and the mixing shall continue until the cement is uniformly distributed and the mass is uniform in color and homogeneous. Whenever possible,the concrete shall be deposited directly from the mixed to position,without rehandling.

Hand mixing.

If the concrete is mixed by hand,the cement and fine aggregate shall be mixed dry on a watertight platform and the mixture turned and returned until the mass is of an uniform color throughout;the required amount of coarse aggregate and water shall then be added and the mixing continued until the mass is of an uniform

color, and homogeneous.

Retempering.

Retempering mortar or concrete which has partially hardened; that is, mixing with additional materials, will not be permitted.

Forms.

Either wooden or metal forms may be used. They shall be free from warp and of sufficient strength to resist springing out of shape when properly staked.

The forms shall be well staked or otherwise held in place to the established lines and grades, and their upper edges shall conform to the established grade of the pavement.

All wooden forms shall be thoroughly wetted or oiled, and metal forms oiled before any material is deposited against them. All mortar and dirt shall be removed from forms which have been previously used.

Proportions.

The densest possible mixture of the aggregates making up the concrete is desirable. The proportion of cement to total mixture shall be not less than one part Portland cement to six parts total aggregate. The aggregates shall be proportioned in such way that the quantity of fine aggregate to be added to the coarse aggregate shall be of such amount as to produce the minimum of voids when the two are mixed together. When the voids are not determined, the concrete shall be mixed at least in the proportion of one bag of Portland cement, two cubic feet of fine aggrehate, and four cubic feet of coarse aggregate. The concrete when mixed under

field conditions in the proportions above described, shall show a compressive strength of at least 1500 pounds per square inch at the end of twenty eight days.

Sufficient water shall be used during mixing, to produce a concrete of a consistency that will require light tamping to flush mortar to the surface.

Laying the concrete.

Upon the sub-grade prepared in accordance with the specifications for grading, shall be laid the concrete foundation of the proportions described above and which shall have a thickness of six(6) inches when compacted.

The concrete shall be deposited in a layer on the sub-grade in such quantities that, after being thoroughly rammed into place, it will be of the required thickness and the upper surface true, uniform and parallel with the surface of the finished pavement. If deemed necessary by the engineer, the surface of the sub-grade shall be sprinkled with water before beginning the work of depositing the concrete.

The whole operation of mixing and laying the concrete shall be done as expeditiously as possible with a sufficient number of skilled men; and under no circumstances shall more than thirty minutes elapse between the mixing and the depositing of any batch. No retempering of concrete will be permitted and any concrete in which the cement has begun to set, will be rejected.

The contractor shall employ at least two men whose special duty it shall be, to use a strike board having a curvature corresponding

to the crown of the pavement,so that the top may be properly stroked off. The surface,before complete hardening has taken place,shall be roughened with a stiff broom or brush. Such broom or brush shall be placed lightly upon the concrete at the beginning of each stroke. After tamping,and until complete hardening,the workmen shall not be allowed to walk upon the concrete,but shall use planks or bridges if any work upon the surface is necessary,

As soon as laid and before the top begins to dry, the entire surface of the concrete shall be covered with one(1)inch of clean, sharp sand to protect it from the sun and wind. The sand so spread shall be kept moist until the wearing surface is laid,or until the concrete has thoroughly set.

The concrete shall be allowed to set four(4)days before any other work is done upon it.

No driving or wheeling over the concrete will be permitted until the wearing surface is in palce,and if the surface of the concrete is to constitute the wearing surface,it shall be protected from all traffic for at least ten days. Any damage done to the concrete by vehicles passing over it,shall be repaired by the contractor without extra compensation.

No concrete shall be laid when the temperature at any time during the day falls below thirty-five(35)degrees F.,and if this temperature is reached at any time before the concrete shall have become thoroughly set,it shall be provided with such covering as will protect it from damage. The use of manure for such purpose is prohibited.

Sand-cushion.

Upon the concrete foundation prepared as heretofore specified, shall be laid a sand cushion,two(2)inches in thickness after compacting. The sand to be of the quality described on page 4 of these specifications,and is to be spread with the aid of a templet having a steel faced edge,reaching the whole or one-half the width of the street and made to conform to the true curvature of the street cross-section. The compressing shall be done with a hand roller weighing from three hundred(300) to four hundred(400)pounds.

The sand is to be laid dry and the cushion is to be prepared at least fifty(50)feet in advance of the brick laying. During showers the sand shall be properly protected. Whenever the sand after rolling has become wet,it shall be allowed to dry before the brick are laid upon it.

Brick wearing surface.

For specifications covering the requirements of paving brick, see pages 5 and 6 of these specifications.

Upon the sand cushion prepared as above described,shall be laid a course of brick on edge and end to end across the street at right angles to the curb except at street and alley intersections,where they will be laid as shown upon the plans,or according to the directions of the engineer.

The brick shall all be hauled and neatly piled in proper quantity without the curb line before the grading is begun. In unloading and hauling from the car,no throwing or dumping will be permitted. From these piles,the brick are to be carried on pallets or with

clamps,or be conveyed to the brick setter on a gravity carrier. No wheeling in barrows or other conveyances over the brick surface will be permitted. The brick shall be placed to the convenience of thr brick setter or dropper,so that he will drop them into place in the pavement,on edge,with the best edge uppermost,and at right angles with the curb line. All longitudinal joints must be broken by a lap of half the length of a brick.

The brick shall be laid in close contact with each other,by skilled workmen,who shall stand on the brick already laid,and in no case shall the bed of sand in front of the pavement be disturbed or walked upon,after having been smoothed over and brought to the exact crown and grade. All bricks to be laid with the lugs in the same direction,so that there will be sufficient space between the rows for grouting. After the brick are laid,the end joints are to be made close and tight by the use of a steel bar applied to the ends next to the curbs. At every fourth course,or as often as directed,the side joints are to be closed up as much as possible and the courses straightened in a manner satisfactory to the engineer, but in no case will the use of sledges for this purpose be permitted. Nothing but whole brick shall be used except in starting or finishing a course at either curb or at catch-basins,man-holes,ets.

In all cases the end joints shall be made close and tight. The cutting and trimming of brick shall be done by experienced men,and proper care taken not to fracture or check the part to be used;The joints shall be at right angles to the sides and tops. After a sufficient number of brick have been laid,the pavement shall be thor-

oughly wet by sprinkling,and all soft,broken or badly misshapen brick will be marked and removed by the inspector or his assistants. Brick slightly spalled or kiln-marked will be marked to turn over, and should the opposite face be acceptable,it may remain in the pavement;otherwise it shall be removed. The contractor shall immediately remove all rejected brick from the pavement,using tongs with broad flat noses and long stout handles. The spaces so,left shall be filled with new brick,care being taken in making such replacements that the brick so replaced are in conformity with the specifications for paving brick.

After all objectionable bricks are removed from the pavement and all replacements made,the pavement shall be swept clean and thoroughly rolled with a light roller as specified,until the bricks are thoroughly and evenly bedded in the sand cushion. Any unevenness or irregularities of the surface after rolling,shall be trued by means of ramming,using a heavy paver's rammer on a two inch plank laid parallel with the edging.

The rolling is to be carried out as follows: The roller to weigh not less than three(3)tons,nor more than five(5)tons: the brick next to the curb are to be tamped with a hand,wood tamper to the proper gutter grade whenever it is found impossible to use the roller close to the curb. The rolling will then commence near the curb at a very slow pace and continue back and forth parallel with the curb until the center of the pavement is reached,then pass to the opposite curb and repeat in the same manner to the center of the street. As the roller passes back and forth it shall overlap its course each time. After the passage of the roller,the pace may be quick-

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[illegible]

[illegible]

[illegible]

ened and the rolling shall be continued until each brick is firmly imbedded in the sand cushion. The pavement shall then be rerolled the entire width of the street transversely and at an angle of 45 degrees with the curb. The rolling will then be repeated in the opposite direction. Before this transverse rolling takes place,all broken or injured brick shall be taken up and replaced with satisfactory brick. The substituted brick shall be brought to true surface by tamping.

After final rolling the pavement shall be tested with a ten(10) foot straight edge,laid parallel with the curb,and any depression or projection exceeding one-quarter($\frac{1}{4}$)inch,must be taken out. If necessary,the pavement shall be rerolled.

Expansion cushion.

An expansion cushion shall be provided for,parallel with and next to each curb,or to the gutter flag of the combined curb and gutter. It shall be one(1)inch in thickness for pavements thirty (30)feet wide or less. While the brick are being laid,the spaces to be occupied by the expansion cushions are to be maintained with boards of good quality,supported throughout their length upon the sand cushion. These boards are to be kept in place until the pavement is otherwise entirely completed. These boards will then be removed and the spaces filled with heavy pitch or asphaltum composition,having a melting point of not less than one hundred and twenty(120)degrees F.,nor more than one hundred and forty(140)degrees F.,care being taken that the entire space is filled from top to bottom.

Joint-filler.

The joint-filler when in place in the pavement,shall be of such character that it will adhere firmly to the paving brick and to the gutter flag,and shall be sufficiently plastic to allow for the contraction and expansion in the pavement without developing cracks in the joints. It shall be proof against action by water and all acids and alkalis to which the pavement may be exposed.

The free carbon shall be not less than 25 per cent nor more than 40 per cent. The specific gravity shall be not less than 1.25 nor more than 1.30 at 60 degrees F.

It shall have a melting-point varying not more than 5 degrees from 135 degrees F.

At the time of filling the joints,the bricks shall be perfectly dry. The filler shall be heated and poured into the joints to the full depth thereof,at a temperature of not less than 300 degrees F.,nor more than 350 degrees F. All joints shall be completely filled to the top. All surplus filler shall be immediately broomed out over the surface of the brick. A top dressing of sand shall be spread over the pavement immediately after the filler is applied and while it is still soft. In cold weather,the sand shall be heated so as to readily bond with the pitch. Extra care shall be used at the gutters and around catch-basins,man-holes,&c., to effectually prevent the leakage of water into the sub-roadway.

After completion of the joint-filling as above described,the pavement shall be protected from traffic for at least twenty-four (24)hours.

Concrete combined curb and gutter.

All grades and lines will be given by the engineer and the combined curb and gutter is to be built in place before the work of grading the street is begun. The combined curb and gutter shall rest upon a foundation of cinders or coarse sand,which must be six(6) inches in thickness after being thoroughly flooded and compactly rammed to an even surface.

The curb and gutter shall be made of concrete formed by intimately mixing one(1)part of Portland cement with two(2)parts of finely crushed limestone or sand. To the above mixture of cement and sand,or limestone,is to be added four(4)parts of broken limestone,and the whole thoroughly mixed together. After the mass is thoroughly mixed together,sufficient water is to be added to thoroughly wet the same,and the whole shall then be thoroughly mixed until the mass is uniform in color and homogeneous. The mixture shall be immediately placed in the forms and rammed until a film of moisture appears on top.

The gutter flag and curb shall in all details conform to the detail plans.

The exposed surface of the curb and gutter shall be covered with a finishing coat,one(1)inch in thickness. The finishing coat shall be a mortar composed of one(1)part of Portland cement,thoroughly mixed with one and one-half(1½)parts of finely crushed limestone or clean,sharp sand,to which sufficient water is to be added that the mass shall have such a consistency as not to require tamping,but to be simply floated with a straight-edge. The finishing coat is to be applied before the concrete has begun to stiff-

en. The curb and gutter is to be cut into sections not exceeding six(6)feet in length. Circular curb and gutter is to be built where shown upon the plans.

All forms are to remain in place at least forty-eight(48) hours after the mixture is placed therein.

Where cross-walks are formed in the pavement,the contractor shall build without extra charge,in monolithic construction with the flag,such riser as to conform with the pavement and flush with the surface of the curb.

The contractor shall build in,without extra charge,all necessary inlets to properly connect the combined curb and gutter with the drains.

The broken stone shall be clean,free from dust,loam and dirt, crusher-run,and of varying sizes which will pass through a ring one and one-half($1\frac{1}{2}$)inches internal diameter and be held on a ring of one-quarter($\frac{1}{4}$)inch internal diameter. The material shall be hard and tough and shall contain no flat,or elongated particles.

The finely crushed stone shall be hard and tough, clean,dry and free from loam and dirt.

The curb and gutter shall be back-filled to the top,and filling at that point shall be level and four(4)feet wide,and then shall have a slope of one and one-half($1\frac{1}{2}$)horizontal to one(1) vertical.

The sand shall be clean,free from loam or dirt and not too fine.

The prices bid for combinedd curb and gutter per lineal foot are to include all cost of grading,inlets,"risers"and back-filling.

Concrete curb.

The concrete curb is to be constructed to such lines and grades as the engineer may direct.

In all details, the construction is to conform to the detail plans, and the quality of the materials and methods of construction are to conform to the specifications for "Combined curb and gutter".

Inlets.

Cast iron inlets of approved pattern are to be set at the points indicated upon the plans and are to be connected directly with the drains in the side ditches.

Drains.

Along the line of the ditches and upon either side of the pavement, outside of the curb, trenches are to be excavated to the depth, grade and alignment shown upon the plans. In these trenches will be laid vitrified drain tile of the sizes indicated. Care shall be taken in laying the pipe, that the spigot end of each pipe is inserted to the full depth of the bell of the next pipe. The joints are to be uncemented. The back-filling around the pipe and to a depth of one(1)foot above the pipe, shall be clean, coarse gravel. The remainder of the fill up to the proper level may then be done as expeditiously as possible with material excavated from the ditch and from the roadbed, care being taken however, to properly tamp and consolidate the back-fill. At the points indicated upon the plans, specials shall be set to receive the leads from the inlets.

The leads from the inlets to the drains shall be constructed of first class sewer pipe, ten(10)inches in diameter unless other-

wise ordered. The joints are to be carefully cemented with Portland cement mortar mixed in the proportion of one part of Portland cement to two parts of clean, sharp sand. Care must be taken to support the leads throughout their length. The interior of the pipe must be left smooth, no mortar being left on the inside of the pipe at joints or otherwise, to interfere with the flow of water through the pipes.

Catch-basins.

Wherever indicated by the plans and at the direction of the engineer, catch-basins are to be constructed in accordance with the detail plans. Good merchantable brick may be used and cemented with Portland cement mortar, mixed in the proportion of one part of cement to two parts of clean, sharp sand. The inlet and outlet pipes to be built into place; the basin to be surmounted by a cast iron cover and frame weighing not less than 375 pounds.

Reinforced concrete pipe.

At the points shown upon the plans, culverts of reinforced concrete pipe will be constructed. The pipe to be used must be of proper thickness and amply reinforced and in every way acceptable to the engineer.

The bottom of the trench in which the pipes are to be laid must be carefully excavated to the given line and grade, and any soft spots must be filled, if necessary, with gravel thoroughly tamped into place, to the end that the pipe may rest at full length upon a proper bearing surface. The ends of the pipe are to be protected with concrete buttresses, constructed as per plans. The backfilling, where there is sufficient head room between the top of the

pipe and the concrete foundation of the pavement, is to be carefully tamped into place, especial care being taken to fill in around the sides of the pipe so as to yield a proper support.

The concrete for the buttresses is to be mixed in the proportion of one part of Portland cement to two parts of clean, sharp sand, and four parts of broken stone. The requirements for broken stone are to be found on page 4 of these specifications.

Marginal curb.

Marginal curb will be set at the ends of paved areas to protect a paved area from one unpaved.

The marginal curb shall be of the best quality of Bearea sandstone or hard Oolitic limestone, or the equivalent, and shall be four(4)inches thick, fourteen(14)inches wide and not less than four (4)feet in length. It shall be set where shown upon the plans, and in such other places as the engineer may direct.

It shall be dressed on top and six(6)inches down on the face next to the pavement; it shall be set to accurately fit the curvature of the surface of the pavement, upon four(4)inches of concrete and backed up with a four(4)inch thickness of concrete to within six(6)inches of the top. The remaining six(6)inches to be filled in with clean gravel extending three(3)feet back of the curbing and thoroughly rammed.

Patents and Trade secrets.

All fees for any patented invention, article or arrangement that is used upon or in any manner connected with the construction, erection or maintenance of the work, or any part thereof embraced

in the contract and these specifications,shall be included in the price stipulated in the contract for said work,and the contractor must protect and hold harmless,the City of Rushville,Illinois, against any and all demands for such fees or claims.

It is hereby agreed that alleged ownership by any contractor of trade secrets as to materials used in any part of the work,or the preparation of any mixture for such work,shall not be recognized by the City of Rushville,in the performance of the contract. The Board of Local Improvements shall at all times have the right to demend and shall be furnished information concerning materials or samples of ingredients of any materials used,or proposed to be used in the preparation of the pavement to be laid;nor shall mixtures once agreed upon be chabged in any manner without the knowledge and consent of the Board of Local Improvements.

Guarantee.

The contractor will be required to furnish a satisfactory surety bond guaranteeing the maintenance of the pavement during a period of three(3)years from and after the date of the completion of the same and its acceptance by the Board of Local Improvements.

SPECIFICATIONS

for Reinforced Concrete Paving.

Grading.

For specifications for grading, see pages 1,2,3 and 4 of the specifications for Brick paving.

MATERIALS.

Gravel.

For specifications for gravel see page 4 of the specifications for Brick paving.

Sand.

For specifications for sand see specifications page 4 of Brick paving.

Stone.

For specifications for broken stone see pages 4 and 5 of the specifications for Brick paving.

Cement.

For specifications for cement see page 5 of the specifications for Brick paving.

Making and Laying the Concrete base.

Fine aggregate.

Fine aggregate shall consist of sand, crushed stone or gravel screenings graded from fine to coarse, and passing when dry, a screen of one-quarter($\frac{1}{4}$)inch mesh. It shall be preferably of siliceous material, clean, free from soft particles and dust, both loose and oc-

curring as a coating on the grains, free from loam, vegetable matter or other deleterious material; and not more than three per cent shall pass a sieve having 100 meshes per lineal inch. Fine aggregate shall be of such quality that mortar composed of one part Portland cement and three parts fine aggregate, by weight, when made into briquettes, will show a tensile strength at least equal to the strength of 1:3 mortar of the same consistency, made with the same cement and standard Ottawa sand. In no case shall fine aggregate containing frost lumps be used.

Coarse aggregate.

Coarse aggregate shall consist of inert materials, such as broken stone, or gravel, graded in size, retained on a screen of one-quarter($\frac{1}{4}$) inch mesh, and passing a screen of one and one-half($1\frac{1}{2}$) inch mesh. It shall be clean, hard, durable, and free from all deleterious matter and shall contain no soft, flat or elongated particles. In no case shall coarse aggregate containing frost or lumps of frozen materials be used.

Natural mixed aggregates.

Natural mixed aggregates shall not be used as they come from deposits, but shall be screened and remixed to agree with the proportions specified.

Water.

Water shall be clean, free from oil, acid, alkali or vegetable matter.

MEASURING AND MIXING.

Measuring.

The fine aggregate and the coarse aggregate shall be measured in suitable bottomless measuring boxes or by equally accurate devices. A bag of Portland cement,of ninety-four(94)pounds net weight,shall be considered one cubic foot.

Machine mixing.

A batch mixer shall be used. The ingredients of the concrete shall be mixed to the desired consistency and the mixing shall continue until the cement is uniformly distributed and the mass is uniform in color and homogeneous. Whenever possible,the concrete shall be deposited directly from the mixer to position in the pavement without rehandling.

Hand mixing.

If the concrete is mixed by hand,the cement and fine aggregate shall be mixed dry on a watertight platform and the mixture turned and returned until the mass is of an uniform color throughout; the required amount of coarse aggregate and water shall then be added and the mixing continued until the mass is of uniform color and homogeneous.

Retempering.

Retempering mortar or concrete which has partially hardened, that is,mixing with additional materials,will not be permitted.

Forms.

Either wooden or metal forms shall be used. They shall be free from warp and of sufficient strength to resist springing out of shape when properly staked.

The forms shall be well staked or otherwise held in place to the established lines and grades, and their upper edges shall conform to the established grade of the pavement.

All wooden forms shall be thoroughly wetted or oiled, and metal forms oiled before any material is deposited against them. All mortar and dirt shall be removed from forms which have been previously used.

Proportions.

The densest possible mixture of the aggregate making up the concrete is desirable. The proportion of cement to total aggregate shall not be less than one part Portland cement to six parts total aggregate..The aggregate shall be proportioned in such way that the quantity of fine aggregate to be added to the coarse aggregate shall be of such amount as to produce the minimum of voids when the two are mixed together. When the voids are not determined, the concrete shall be mixed at least in the proportion of one bag of Portland cement, two cubic feet of fine aggregate, and four cubic feet of coarse aggregate. The concrete when mixed under field conditions in the proportions above described, shall show a compressive strength of at least 1500 pounds per square inch at the end of twenty-eight days.

Sufficient water shall be added during mixing, to produce a concrete of a consistency that will require light tamping to flush mortar to the surface.

Laying the concrete.

Upon the sub-grade prepared in accordance with the specifications for grading, shall be laid the concrete foundation of the

proportions described above and which shall have a thickness of six(6)inches when compacted.

The concrete shall be deposited in a layer on the sub-grade in such quantities that,after being thoroughly rammed into place, it will be of the required thickness and the upper surface true, uniform and parallel with the surface of the finished pavement. If deemed necessary by the engineer,the surface of the sub-grade shall be sprinkled with water before beginning the work of depositing the concrete.

The whole operation of mixing and laying the concrete shall be done as expeditiously as possible with a sufficient number of skilled me,and under no circumstances shall more than thirty minutes elapse between the mixing and the depositing of any batch. No retempering of concrete will be permitted and any concrete in which the cement has begun to set,will be rejected.

The contractor shall employ at least two men whose special duty it shall be,to use a strike board having a curvature corresponding to the crown of the pavement,so that the top may be properly stroked off. The surface,before complete hardening has taken place,shall be roughened with a stiff broom or brush. Such broom or brush shall be placed lightly upon the concrete at the beginning of each stroke. After tamping,and until complete hardening, the workmen shall not be allowed to walk upon the concrete,but shall use planks or bridges if any work upon the surface is necessary.

As soon as laid and before the top begins to dry,the entire surface of the concrete shall be covered with one(1)inch of clean,

sharp sand to protect it from the sun and wind. The sand so spread shall be kept moist until the wearing surface and the body of the concrete has completely hardened and until the pavement is thrown open to traffic.

No driving or wheeling over the surface of the concrete will be permitted and it shall be protected from all traffic for at least ten days. Any damage done to the concrete by vehicles passing over it,shall be repaired by the contractor without extra compensation.

No concrete shall be laid when the temperature at any time during the day,falls below thirty-five(35)degrees F.,and if this temperature is reached at any time before the concrete shall have become thoroughly set,it shall be protected with such covering as will prevent damage. The use of manure for such purpose is prohibited.

Steel Reinforcement.

The concrete is to be reinforced with steel,the same to consist of triangular mesh,steel wire fabric. The cross-sectional area of the transverse reinforcing shall amount to at least 0.066 square inch per lineal foot of length of roadway measured parallel to the axis of the street. The cross-sectional area of the longitudinal reinforcing shall amount to at least 0.38 square inch per lineal foot of width of roadway measured perpendicular to the axis of the street. The reinforcing shall be placed two inches below the upper surface of the pavement,and shall be so laid as to thoroughly engage with the concrete. It shall be lapped,where necessary,sufficiently to develop the full strength of the metal,but not

less than twelve(12)inches. The reinforcement shall extend to within one inch of all joints in pavement and under no conditions shall be continuous across them.

Contraction joints.

Contraction joints shall be made not more than twenty-five feet apart,perpendicular to the center line of the pavement. Care shall be exercised to have the joints vertical and of uniform width. The contraction joint shall be continuous through the curb.

The contraction joint shall be cut not more than one-fourth inch wide,extending through the full thickness of the concrete. The joint is to be filled with the expansion joint filler as hereinafter described. Should a form be used to make this cut,the same shall be of iron or steel in the form of a templet cut to the desired shape of the street and of sufficient strength to resist springing out of shape. The forms when necessary,shall be well staked to conform to the established lines and grades. The edges of all joints shall be rounded to a radius of one-half($\frac{1}{2}$)inch with proper tools,and the cement concrete for a width of one inch on each side of the joints shall be tooled down,hard and smooth.

Expansion joints.

Expansion joints are to be provided between the concrete of the pavement and the concrete curb. These expansion joints are to be extended through the entire thickness of the pavement and the upper edges shall be neatly rounded off to a radius of one-half ($\frac{1}{2}$)inch,to prevent chipping and spalling.

The expansion joints shall be one-half($\frac{1}{2}$)of an inch thick and while the concrete is being laid,the spaces to be filled by the

expansion cushions are to be maintained with boards of good quality, supported throughout their length. These boards are to be kept in place until the pavement is otherwise entirely completed. These boards will then be removed and the spaces filled with heavy pitch or asphaltum composition, having a melting point of not less than one hundred and twenty (120) degrees F., nor moe than one hundred and forty (140) degrees F., care being taken that the entire space is filled from top to bottom.

Concrete curb.

For specifications for concrete curb, see specifications for concrete curb and concrete combined curb and gutter, pages, 17, 18 and 19 of the specifications for Brick paving.

Inlets.

For specifications for inlets see page 19 of the specifications for Brick paving.

Drains.

For specifications for drains see pages 19 and 20 of the specifications for Brick paving.

Catch-basins.

For specifications for catch-basins see page 20 of the specifications for Brick paving.

Reinforced concrete pipe.

For specifications for reinforced concrete pipe see pages 20 and 21 of the specifications for Brick paving.

Marginal curb.

For specifications for marginal curb, see page 21 of the specifications for Brick paving.

Patents and Trade secrets.

See pages 21 and 22 of the specifications for Brick paving.

Guarantee.

The contractor will be required to furnish a satisfactory surety bond guaranteeing the maintenance of the pavement during a pariod of three(3)years from and after the date of the completion of the same and its acceptance by the Board of Local Improvements.

Estimate of cost of Paving at Rushville, Illinois.

February 1914.

From West tracks of C. B. & Q. Ry. to Corporate Limits
24 feet wide - Brick.

Excavation	at 35¢ plus 5%	1200 cu. yds.	$ 441.00
Stone curbing set in concrete	at 66-1/2¢ " "	2721	1899.93
Brick Pavement	at $2.00 " "	3699.3 Sq. yds	7768.53
Circular Curb	at $1.25 " "	81.9 ft.	107.50
Retaining Stone	at 66-1/2¢ " "	24.0	19.91
Castings, specials			43.72
Drains	at 30¢ " "	2446.96 ft.	771.42
6% for engineering, attorneys etc.			663.12

Congress Street

From present pavement to south property line of Jefferson St. on Congress.

Earthwork	at 35¢ plus 5%	210.4 cu. yds.	77.32
Straight Curb	at 66-1/2¢ " "	537 ft.	374.96
Circular Curb	at $1.25 " "	126 ft.	16.64
Pavement	at $1.45 " "	917 sq. yds.	1396.14
Drains	at 35¢ " "	560 ft. 10"	205.80
Marginal curb	at 45¢ " "	32 ft.	15.12

Intersection Congress & Jefferson

Straight Curb	at 66-1/2¢ plus 5%	168 ft.	117.31
Circular Curb	at $1.25 " "	25.2 ft.	33.08
Pavement	at $1.45 " "	435 sq. yds	662.29
110 ft. 12" 120 ft. 10" Castings 4 small 2 medium			98.69
Marginal Curb	at 45¢ plus 5%	60 ft.	28.35

Bro't. Forward ---- 14740.83

North property line of Jefferson St. to south property line of Adams St. - On Congress.				
Earthwork	at 35¢ plus 5%		283.00 yds.	104.00
Straight Curb	at 66-1/2¢	" "	466 ft.	325.38
Pavement	at $1.45	" "	777 sq. yds.	1182.98
Drains - 12"	at 45¢	" "	230 ft.	108.68
Intersection Congress & Adams				
Straight Curb	at 66-1/2¢	" "	168 ft.	117.31
Circular Curb	at $1.45	" "	25.2 ft.	33.08
Pavement	at $1.45	" "	435 sq. yds.	662.29
165 ft. 12" - 25 ft. 10" 4 small castings 6 branches 12"				98.60
Marginal Curb	at 45¢ plus 5%		60 ft.	28.35
West property line of Congress St. to East property line of Monroe St. on Adams St.				
Earthwork	at 35¢ plus 5%		300 yds.	110.25
Straight Curb	at 66-1/2¢	" "	777 ft.	542.54
Circular Curb	at $1.25	" "	6.3 ft.	8.27
Pavement	at $1.45	" "	1297 sq. yds	1974.68
Drains - 12"	at 45¢	" "	720 ft.	340.20
2 large castings $13.00 Marginal curb at 45¢ plus 5%			16 ft.	20.56

		Bro't Forward	20398.00
Intersection Adams & Monroe St. 1/2 intersection			
Straight Curb	at 66-1/2¢ plus 5%	84 ft.	58.65
Circular Curb	at $1.25 " "	12.6 ft.	16.64
Pavement	at $1.45 " "	217.5 sq. yds.	331.15
12" - 160' 10" 15' 2 specials 12"			87.25
Marginal Curb	at 54¢ plus 5%	30 ft.	14.18
West Property line of Monroe St. to East line of Maple Ave. on Adams St.			
Excavation	at 35¢ plus 5%	184 yds.	67.64
Straight Curb	at 66-1/2¢ " "	174 ft.	121.50
Pavement	at $1.45 " "	290 sq. yds.	441.53
110' - 12"	at 45¢ " "		51.98
Intersection Adams & Maple - 1/2 intersection			
Straight Curb	at 66-1/2¢ plus 5%	70 ft.	48.88
Circular Curb	at $1.25 " "	12.6 ft.	16.64
Pavement	at $1.45 " "	167.5 sq. yds.	255.02
120' - 12" 10'-10" - 1 casting	" "		62.85
Marginal Curb	at 45¢ " "	24 ft.	10.94
West property line of Maple Ave. to East line of Jackson St.			
Excavation	at 35¢ plus 5%	340 yds.	124.95
Straight Curb	at 66-1/2¢ " "	846 ft.	590.72
Circular Curb	at $1.25 " "	6.3 ft.	8.32
Pavement	at $1.45 " "	1411.5 sq. yds	2149.01
800'-12"	at 45¢ " "		378.00

Bro't Forward 25233.85

Intersection Jackson & Adams St.

Straight Curb	at 66-1/2¢	plus 5%	124 ft.	86.58
Circular Curb	at $1.25	" "	25.2 ft.	33.28
Pavement	at $1.45	" "	336.5 sq. yds	512.33
160'-12" 60'-10" 8 castings 8 specials 12"				125.86
Marginal Curb	at 45¢	plus 5%	57 ft.	26.93

North Side of Adams St. East side of Mason St.
on Macomb road

Excavation	at 35¢	plus 5%	678.7 yds.	267.80
Straight Curb	at 66-1/2¢	" "	1402 ft.	978.95
Circular Curb	at $1.25	" "	18.9 ft.	24.79
Pavement	at $1.45	" "	2246.8	3420.75
1480'-12"	at 45¢	" "		699.30
Marginal Curb	at 45¢	" "	32 ft.	15.12

Intersection Macomb road and Mason St.

Straight Curb	at 66-1/2¢	plus 5%	53 ft.	37.00
Circular Curb	at $1.25	" "	18.9 ft.	24.81
Pavement	at $1.45	" "	134.8 sq. yds	205.23
120'-12" 50'-10" 4 castings 4 specials 12" 2 specials10"				89.57
Marginal Curb	at 45¢	plus 5%	24 ft.	11.34

West side of Mason St. to East Tracks of C B & Q Ry.
on Macomb Road

Excavation	at 35¢	plus 5%	209.0 yds.	76.81
Straight Curb	at 66-1/2¢	" "	231. ft.	161.30
Pavement	at $1.45	" "	346.5 sq. yds	527.55
260' - 12"	at 45¢	" "		122.85

			Bro't Forward	32682.00
End of present pavement to east side of Monroe St. on Lafayette St.				
Excavation	at 35¢	plus 5%	109. yds	40.06
Straight Curb	at 66-1/2¢	" "	513 ft.	158.21
Circular Curb	at $1.25	" "	19 ft.	24.94
Pavement	at $1.45	" "	1007 sq. yds.	1533.16
460' - 12"	at 45¢	" "		217.35
Marginal Curb	at 45¢	" "	48 ft.	22.68
Intersection Lafayette & Monroe St.				
Straight Curb	at 66-1/2¢	plus 5%	168 ft.	117.31
Circular Curb	at $1.25	" "	26 ft.	34.13
Pavement	at $1.45	" "	435 sq. yds	662.29
160'-12" 88'-10" 8 castings 8 specials 12" 2 specials 10"				137.53
Marginal Curb	at 45¢	plus 5%	60 ft.	28.35
West line of Monroe St. to East line of Jackson St.				
Excavation	at 35¢	plus 5%	228.5	83.98
Straight Curb	at 66-1/2¢	" "	1076 ft.	751.32
Circular Curb	at $1.25	" "	12.6 ft,	16.64
Pavement	at $1.45	" "	1796 sq. yds.	2734.41
1025' - 12" 16' -10" 2 castings 2 specials 12"				497.29
Marginal Curb	at 45¢	plus 5%	16 ft.	7.56

		Bro't. Forward	39749.21
Intersection Lafayette St. & Jackson St.			
Straight Curb	at 66-1/2¢ plus 5%	111 ft.	73.81
Circular Curb	at $1.25 " "	26 ft.	34.13
Pavement	at $1.45 " "	344 sq. yds.	523.74
140' - 12" 70' 6 castings 6 specials 12" 2 specials 10"			113.16
Marginal Curb	at 45¢ plus 5%	54 ft.	25.52
West Line of Jackson St. to East Line of Franklin St. on Lafayette.			
Excavation	at 35¢ plus 5%	590 yds.	216.83
Straight Curb	at 66-1/2¢ " "	1673 ft.	1168.18
Circular Curb	at $1.25 " "	6.5	8.54
Pavement	at $1.45 " "	2816 sq. yds.	4287.36
1680'- 12" 2 large castings			806.80
Marginal Curb	at 45¢ " "	16 ft.	7.56
Intersection of Lafayette St. & Franklin St.			
Straight Curb	at 66-1/2¢ plus 5%	100 ft.	69.83
Circular Curb	at $1.25 " "	26 ft.	34.13
Pavement	at $1.45 " "	312 sq. yds.	475.02
265' - 12" 120' - 10" 8 castings 8 specials - 12"			194.37

		Bro't Forward	47788.19

West line of Franklin St. to Corporate Limits

Excavation	at 35¢ plus 5%	593 yds.	217.92
Straight Curb	at 66-1/2¢ " "	1144 ft.	798.80
Circular Curb	at $1.25 " "	12.6 ft.	16.64
Pavement	at $1.45 " "	1940 yds	2953.65
1150 - 12"			543.38
Marginal Curb	at 45¢ " "	32 ft.	15.12

North Side of Madison St. to South side of Lafayette St. on Franklin.

Excavation	at 35¢ plus 5%	461.6 yds	169.64
Straight Curb	at 66-1/2¢ " "	1014 ft.	708.03
Circular Curb	at $1.25 " "	6.3 ft.	8.32
Pavement	at $1.45 " "	1369.5 yds.	2085.07
1000'-12" 2 castings 2 specials - 10"			550.90
Marginal Curb	at 45¢ plus 5%	24 ft.	11.34

North Side of Lafayette St. to South side of Washington St. on Franklin

Excavation	at 35¢ plus 5%	155 yds.	56.96
Straight Curbing	at 66-1/2¢ " "	488 ft.	340.75
Pavement	at $1.45 " "	8133 yds	1238.25
480' - 12"	at 45¢ " "		226.80

		Bro't. Forward	57729.76
Intersection Franklin St. & Washington St.			
Straight Curb	at 66-1/2¢ plus 5%	128 ft.	89.38
Circular "	at $1.25 " "	25.2 ft.	33.28
Pavement	at $1.45 " "	368.2 yds.	560.58
160'-12" 50'-10" 8 castings 8 specials 12" 2 specials 10"			124.61
Marginal Curb	at 45¢ plus 5%	60 ft.	28.35
North line of Washington St. to South Line of Jefferson St. on Franklin			
Excavation	at 35¢ plus 5%	725 yds.	266.44
Straight Curb	at 66-1/2¢ " "	1038 ft.	724.78
Circular Curb	at $1.25 " "	31.2 ft.	40.95
Pavement	at $1.45 " "	1760 ft.	2679.60
960' - 12"			453.60
Marginal Curb	at 45¢ " "	16 ft.	7.56
Intersection Franklin & Jefferson St.			
Straight Curb	at 66-1/2¢ plus 5%	50 ft.	34.91
Circular "	at $1.25 " "	12.6 ft.	16.64
Pavement	at $1.45 " "	150.8 yds.	229.59
120' 12" 40' - 10" 4 castings 4 specials 2 - 10" specials 30' flase curb			100.86
North side of Jefferson St. to South side of Adams St. on Franklin			
Excavation	at 35¢ plus 5%	401 yds	147.37
Straight Curb	at 66-1/2¢ " "	507 ft.	354.02

	Bro't Forward		63622.28
Circular Curb	at $1.25 plus 5%	63 ft.	8.32
Pavement	at $1.45 " "	893.3	1360.05
500' - 12"	at 45¢ " "		236.25
Intersection Franklin & Adams St.			
Straight Curb	at 66-1/2¢ plus 5%	108 ft.	75.41
Circular Curb	at $1.25 " "	25.2 ft.	33.28
Pavement	at $1.45 " "	335 yds.	510.00
180' - 12" 30' - 10" 6 castings 8 specials 12"			120.23
Marginal Curb	at 45¢ plus 5%	60 ft.	28.35
West line of Franklin St. to Burlington Ry. on Adams St.			
Excavation	at 35¢ plus 5%	180 yds.	66.15
Straight Curb	at 66-1/2¢ " "	460 ft.	321.20
Circular Curb	at $1.25 " "	19 ft.	24.94
Pavement	at $1.45 " "	746.7 yds.	1136.86
400' - 12"	at 45¢ " "		189.00
Marginal Curb	at 45¢ " "	30 ft.	14.17
			67746.49
6% for engineering, attorneys etc.			4064.79
			71811.28

LAFAYETTE STREET

BLOCK	Volume Cut Cu. yds	Volume Fill Cu. yds.	Straight Curb Feet	Circular Curb Feet	Sq. Yards Pavement without gutter	Sq. Yards Pavement with 18" gutter	Ditch fill Cu. yds
End of present Pav. to east property line on Monroe St.	89.5	12.3	513	19.	1007	917	263
Intersection Lafayette and Monroe Streets	X		168	26.	435	399	
West prop. line Monroe St. to east Prop. line Jackson	188.5	129.4	1076	12.5	1796	1574	825
Intersection Lafayette and Jackson Streets	X		111	26.0	344	324	
West prop. line Jackson St. to east prop. line Franklin	527.4	4.6	1673	6.5	2816	2533	863
Intersection Lafayette and Franklin Streets	X		100	26.0	312	291	
West prop. line Franklin St. to Corporate limits	548.8	9.4	1144	12.5	1940	1746	154
TOTAL	1354.2	155.7	4785	128.5	8650	7784	2105

FRANKLIN STREET

BLOCK	Volume Cut cu. yds	Volume Fill cu. yds	Straight Curb feet	Circular Curb feet	Sq Yards Pavement No curb	Sq Yards Pavement 18" curb	Ditch Fill
North sidewalk Madison to So. prop. line Lafayette St.	423.6	2	1014	6.3	1369.5	1179.0	225
Intersection Franklin and Madison St.	See Lafayette Street						
North prop. line Lafayette to So prop. line Washington	136.7	37	488		813.3	732.0	129
Intersection Franklin and Washington Sts			128	25.2	368.2	340.5	
North prop. line Washington to So. prop. line Jefferson St	665		1038	31.2	1760.0	1577.8	226
Intersection Franklin and Jefferson Sts.			50	12.6	150.8	136.2	
Jefferson St to Adams St	381		507	6.3	893.3	800.3	130.4
Intersection Franklin and Adams St			108	25.2	335.0	310.5	
TOTAL	1606.3	39	3333	106.8	5690.7	5076.3	710.4

CONGRESS STREET

BLOCK	Volume Cut cu. yds	Volume Fill cu. yds	Straight Curb feet	Circular Curb feet	Sq Yards Pavement without gutter	Sq Yards Pavement with gutter	Ditch Fill cu. yds
From alley to South prop. line Jefferson St.	209.4	1.0	537	12.6	917	816	363.4
Intersection Jefferson and Congress St.	↕		168	25.2	435	399	
North prop. line Jefferson to South prop. line Adams	262.8		466	0.0	777	699	365.7
Intersection Adams and Congress Sts.	↕		168	25.2	435	399	
TOTAL	472.2	1.0	1339	63.0	2564	2313	729.1

ADAMS STREET

BLOCK	Volume Cut Cu. yds	Volume Fill Cu. yds	Straight Curb feet	Circular Curb feet	Sq Yards Pavement No gutter	Sq Yards Pavement 18" gutter	Ditch Fill
West prop. line Franklin to Burlington R.R	160		460	19	746.7	664.5	200.0
ADAMS FROM CONGRESS TO JACKSON							
West prop. line Congress to east prop. line Monroe (N) intersection (S)	125.4	39.6	777	6.3	1297	1165	707.9
Intersection Adams and Monroe Sts. (South side only)			84	12.6	217.5	199.5	
Monroe Street to Maple Street.	175.8		174		290	261	14.9
Intersection Adams and Maple			70	12.6	167.5	152	
Maple Av. to Jackson Street	303.6	21.7	846	6.3	1411.5	1268.5	825.0
Intersection Jackson and Adams Streets			124	25.2	336.5	309.5	
TOTAL	764.8	61.3	2535	82.0	4466.7	4020.0	1881.9

MACOMB ROAD

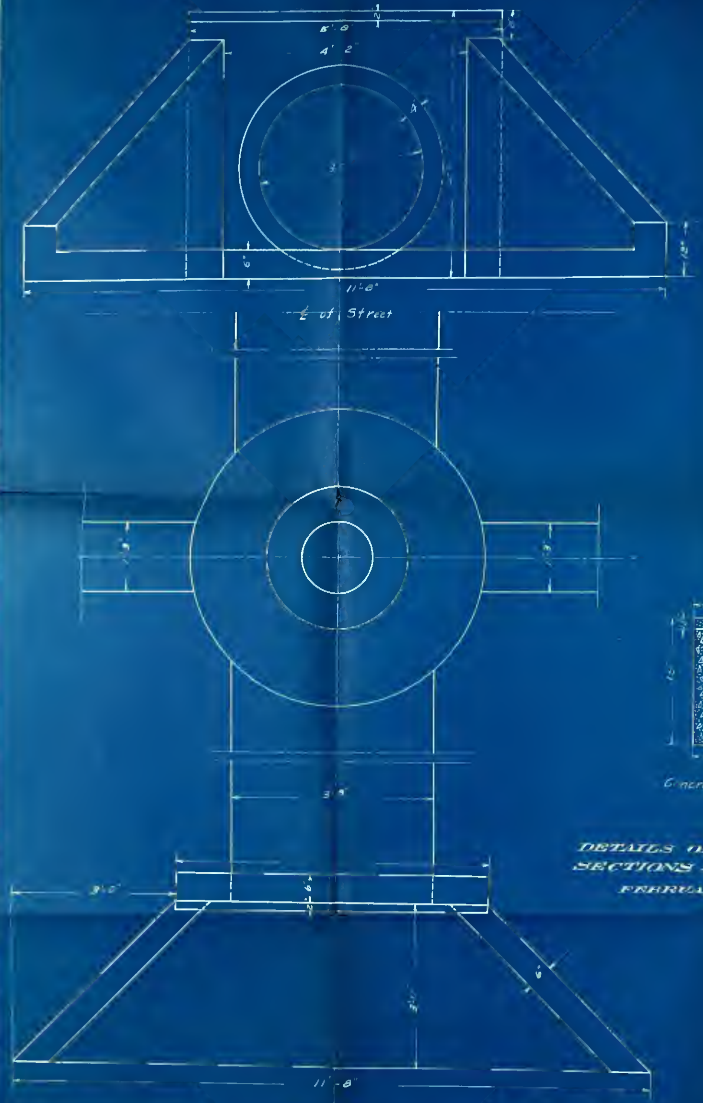
BLOCK	Volume Cut cu yds	Volume Fill cu. yds	Straight Curb feet	Circular Curb feet	Sq Yards Pavement No gutter	Sq Yards Pavement 18" gutter	Ditch Fill
Adams street to Mason St.	678.7		1402	18.9	2246.8	1994.8	529
Intersection Macomb Road and Mason St			53	12.6	134.8	122.8	
Mason St to Burlington tracks	196.0		231	0.0	346.5	308	101
TOTAL	874.7		1686	31.5	2728.1	2425.6	630
MACOMB ROAD NORTH OF BUR. TRACKS							
Burlington R.R. to corporate limit	1098.5	49.7	2721	81.9	3699.3		1162.6

SUMMARY

STREET	Volume Cut Cu yds	Volume Fill Cu. yds	Straight Curb Feet	Circular Curb Feet	Sq Yards Pavement No gutter	Sq Yards Pavement 18" gutter	Ditch fill cu. yds.
LAFAYETTE	1354.2	155.7	4785	128.5	8650.0	7784.0	2105.0
FRANKLIN	1606.3	39.0	3333	106.8	5690.7	5076.3	710.4
CONGRESS	472.2	1.0	1339	63.0	2564.0	2313.0	729.1
ADAMS	764.8	61.3	2535	82.0	4466.7	4020.0	1881.9
MACOMB (To Bur. R.R.)	874.7		1686	31.5	2728.1	2425.6	630.0
TOTAL	5072.2	257.0	13678	411.8	24099.5	21618.9	6056.4
MACOMB (No. of Bur. R.R.)	1098.5	49.7	2721	81.9	3699.3		1162.6

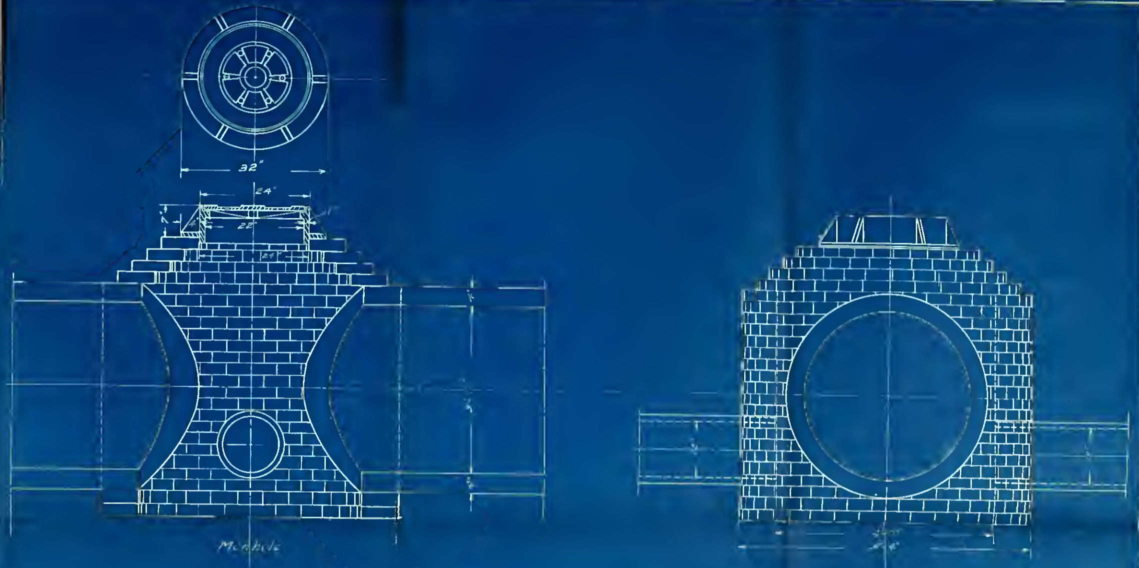
STREET FURNITURE AND DRAIN PIPE

ITEM	LAFAYETTE STREET	FRANKLIN STREET	CONGRESS STREET	ADAMS STREET	MACOMB ROAD	TOTALS
SMALL CASTING	12	10	4	10	1	38
MEDIUM CASTINGS	12	10	2	5	4	37
LARGE CASTINGS	2	1	1	2	2	6
"T" PIPE	24	22	8'	15	4	79
ELBOWS	4	4	2	2	1	14
10" PIPE	200	118	560	105	30	1070
12" DRAIN PIPE	4700	3500	800	2600	4400	16000

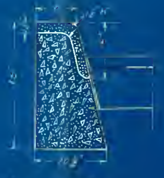

5' 6"
4' 2"
3'
6"
12"
11'-8"
℄ of Street
3' 6"
9'-0"
2'-6"
6"
11'-8"

Design of Culverts

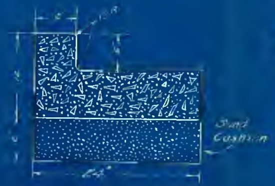
Scale 1"=1'-0"



Manhole



Concrete Curb

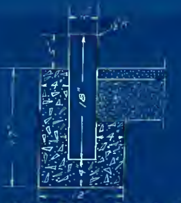

Sand Cushion
24"

Combined Curb and Gutter

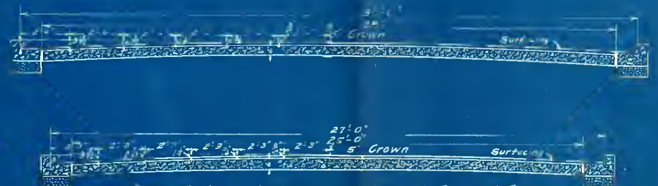
Scale 1½" = 1'-0"

DETAILS OF STREET SECTIONS AND CULVERT

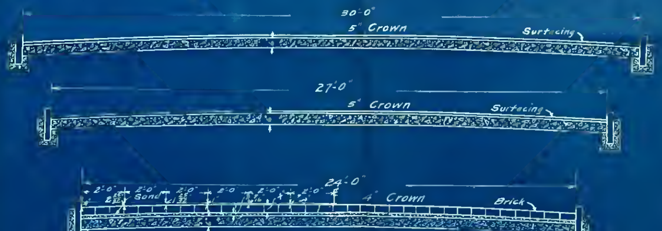
FEBRUARY 1914



Curb Stone Set in Concrete

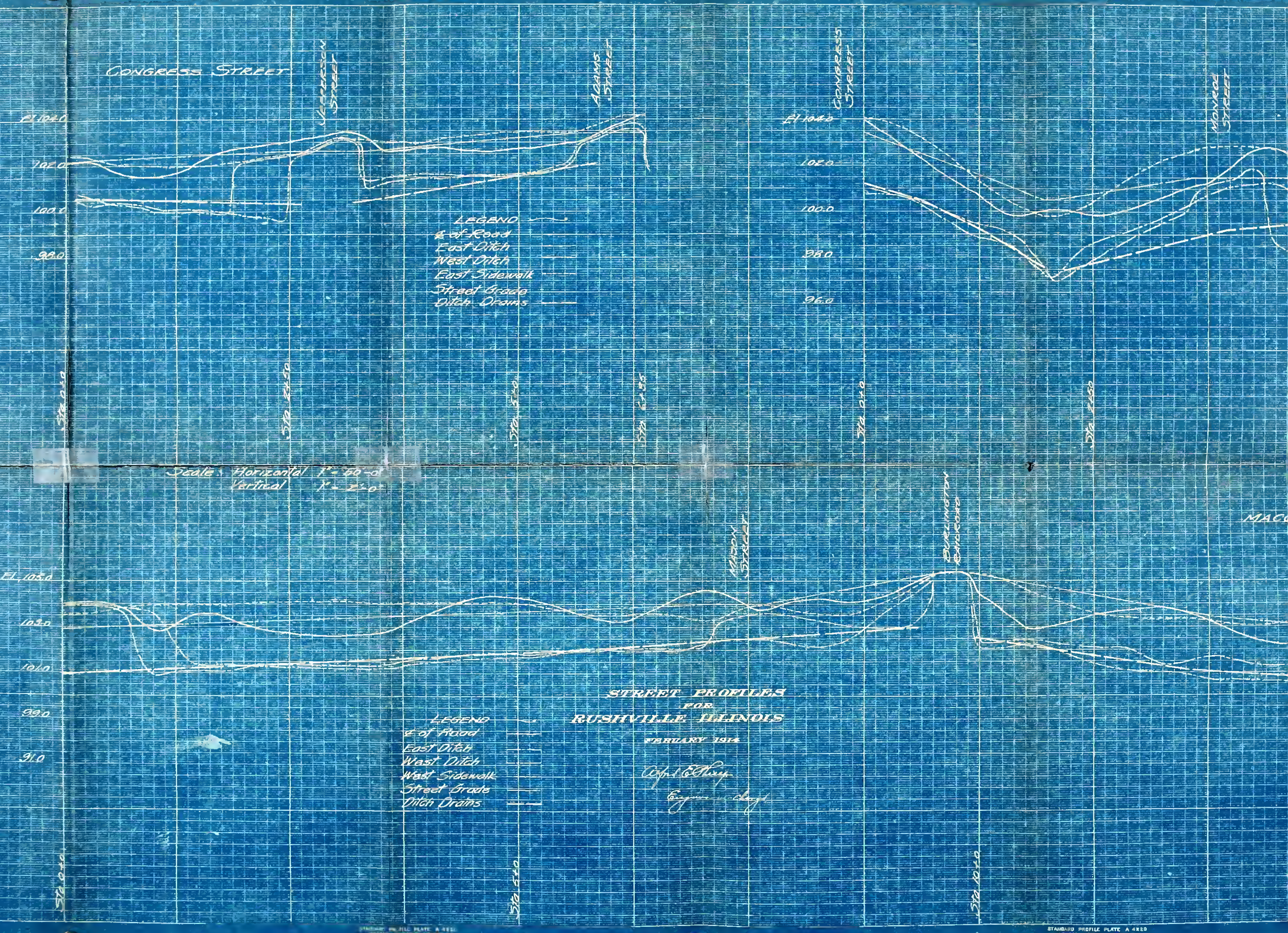

28'
Crown
Surfacing
27'-0"
25'-0"
2'-3"
5" Crown
Surfacing

Cross Section of Streets with Combined Curb and Gutter


30'-0"
5" Crown
Surfacing
27'-0"
5" Crown
Surfacing
24'-0"
2'-0"
Sand
4" Crown
Brick

Cross Section of Streets with Curb Stone Set in Concrete

Alfred E. Tully
Engineer

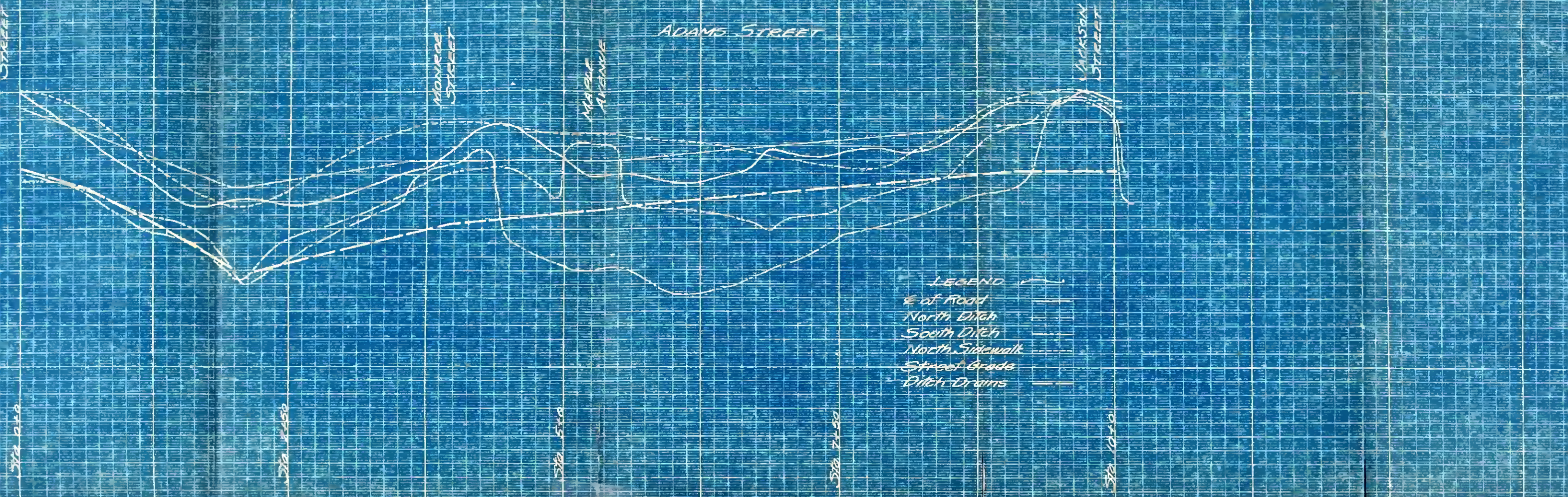

CONGRESS STREET
JEFFERSON STREET
ADAMS STREET
CONGRESS STREET
MONROE STREET
El. 104.0
102.0
100.0
98.0
96.0
LEGEND
℄ of Road
East Ditch
West Ditch
East Sidewalk
Street Grade
Ditch Drains
Sta 0+0
Sta 2+50
Sta 5+0
Sta 6+35
Sta 0+0
Sta 2+50
MASON STREET
BURLINGTON RAILROAD
MAC
El. 105.0
103.0
101.0
99.0
91.0
LEGEND
℄ of Road
East Ditch
West Ditch
West Sidewalk
Street Grade
Ditch Drains
Sta 0+0
Sta 5+0
Sta 10+0
STANDARD PROFILE PLATE A 4×20 KEUFFEL & ESSER CO NEW YORK
STANDARD PROFILE PLATE A 4×20 KEUFFEL & ESSER CO NEW YORK

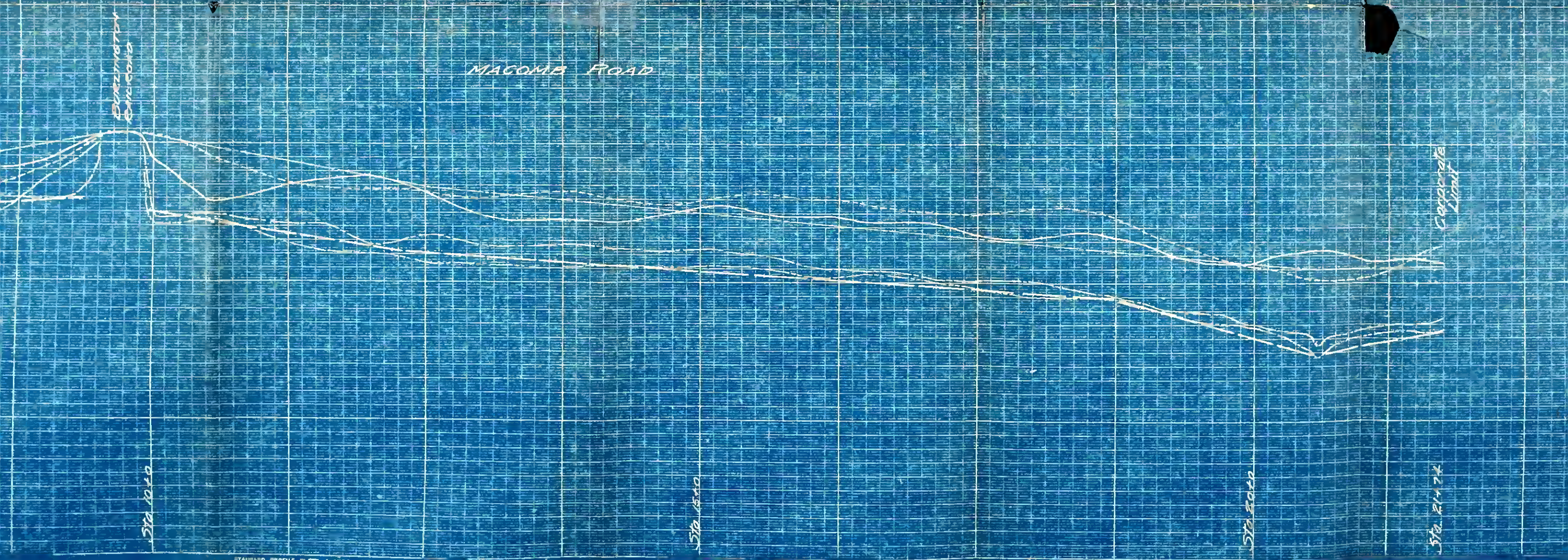
Scale: Horizontal 1" = 60'-0"
Vertical 1" = 2'-0"

STREET PROFILES
FOR
RUSHVILLE ILLINOIS

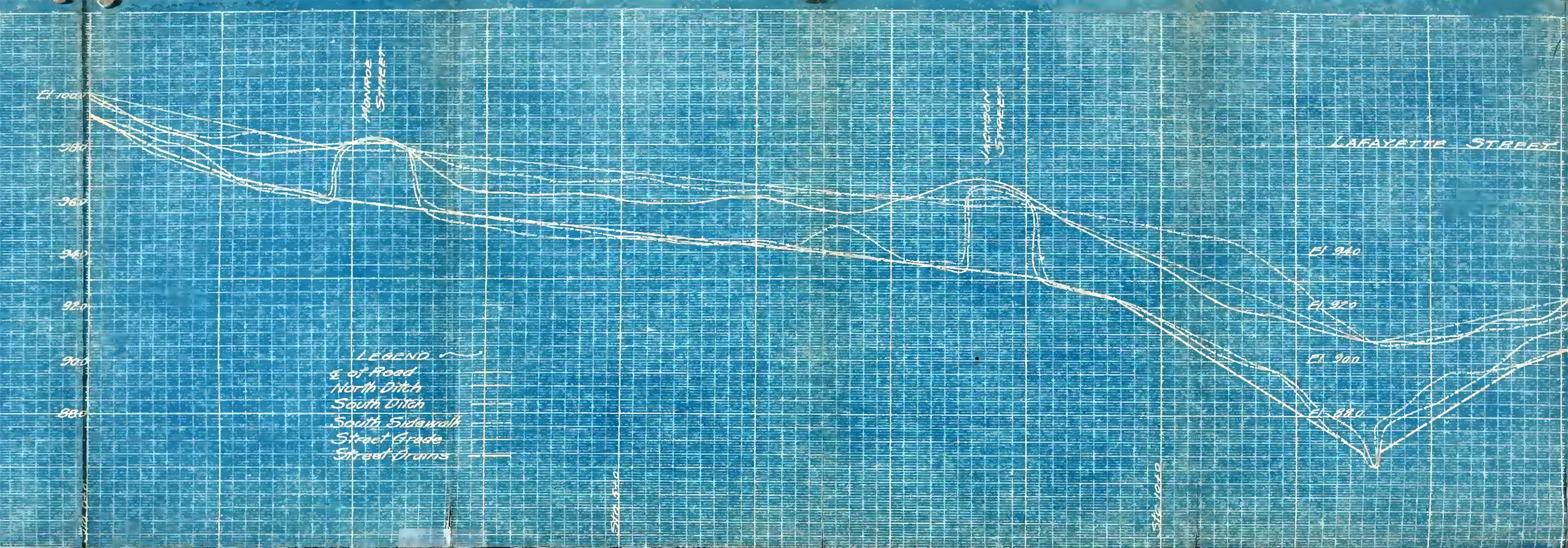
FEBRUARY 1914

Engineer in charge


STREET
ADAMS STREET
MONROE STREET
MAPLE AVENUE
JACKSON STREET
LEGEND
℄ of Road
North Ditch
South Ditch
North Sidewalk
Street Grade
Ditch Drains
Sta 0+0
Sta 2+50
Sta 5+0
Sta 7+50
Sta 10+0

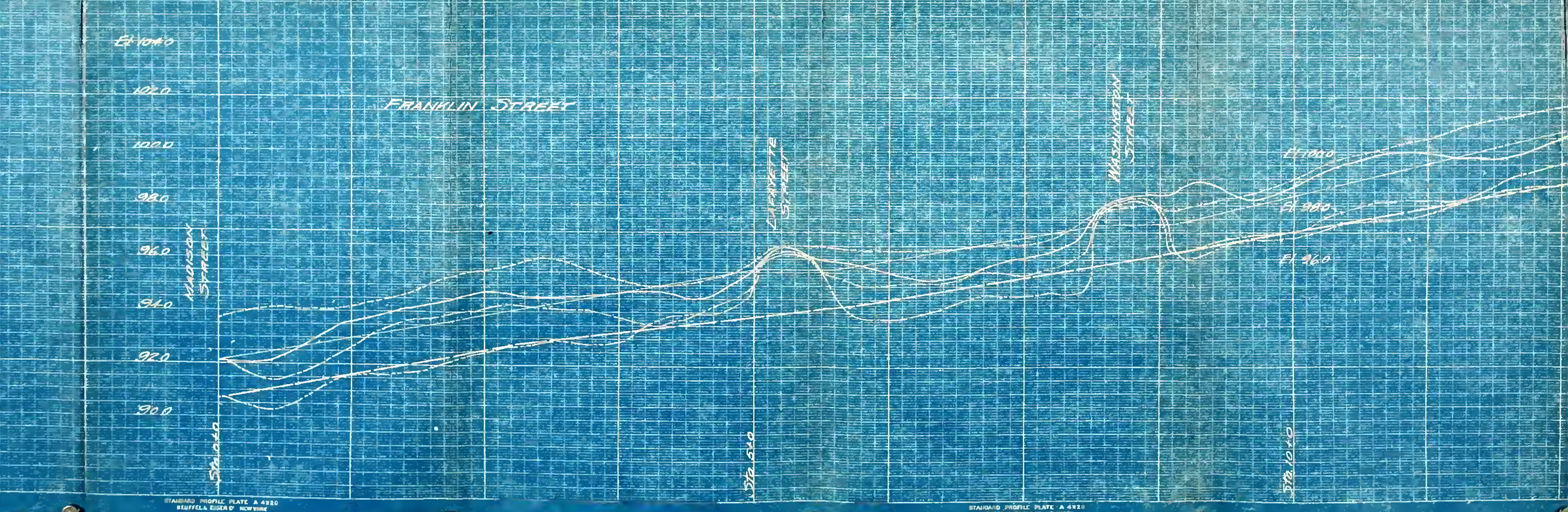

MACOMB ROAD
BURLINGTON RAILROAD
Corporate Limit
Sta 10+0
Sta 15+0
Sta 20+0
Sta 21+74

STANDARD PROFILE PLATE A 4X20
KEUFFEL & ESSER Co NEW YORK
STANDARD PROFILE PLATE A 4X20
KEUFFEL & ESSER Co NEW YORK


El 100.0
98.0
96.0
94.0
92.0
90.0
88.0
MONROE STREET
JACKSON STREET
El 94.0
El 92.0
El 90.0
El 88.0
LEGEND
℄ of Road
North Ditch
South Ditch
South Sidewalk
Street Grade
Street Drains
Sta 0+0
Sta 5+0
Sta 10+0

LAFAYETTE STREET

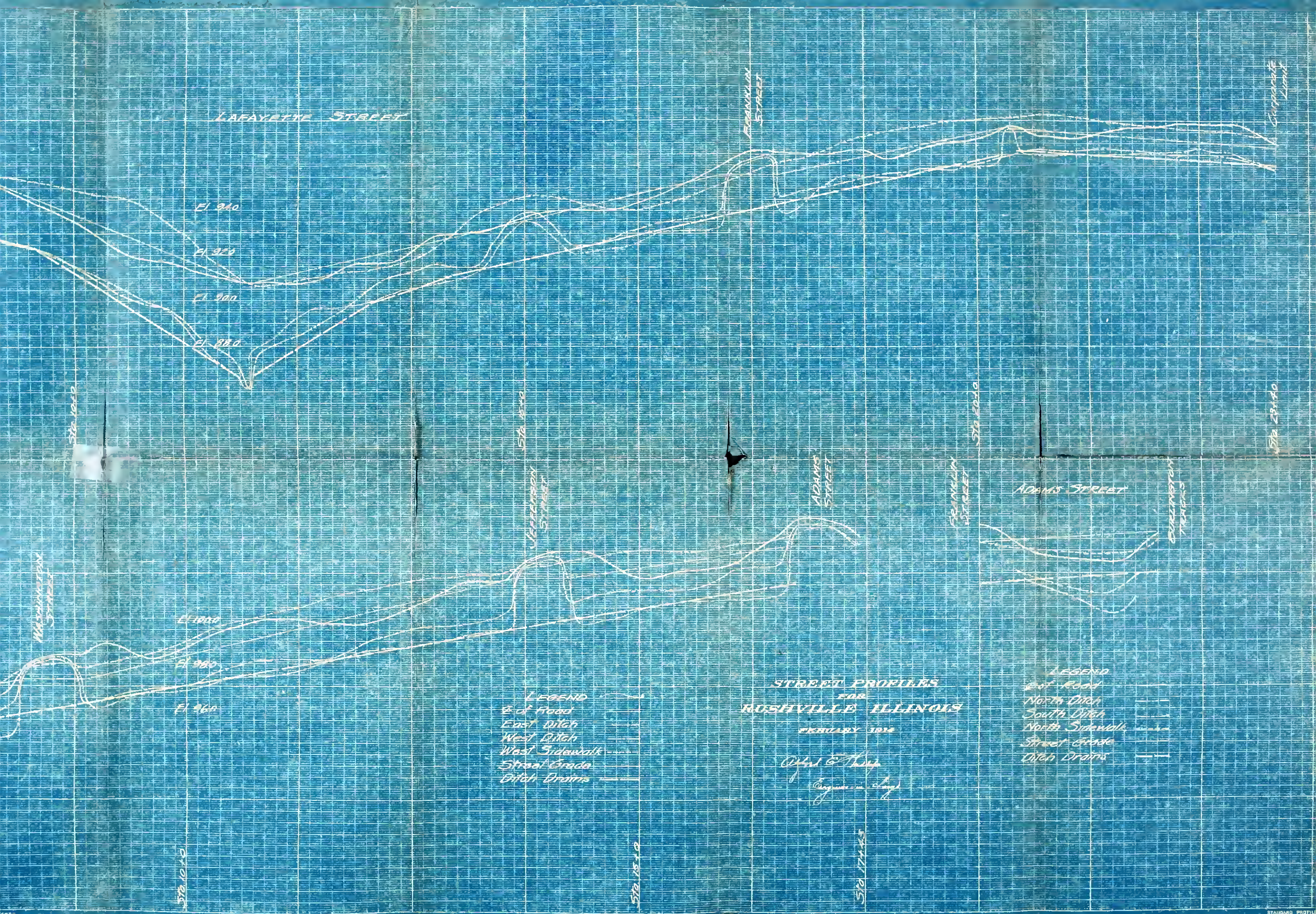
Scale: Horizontal 1" = 60'-0"
Vertical 1" = 2'-0"


El 104.0
102.0
100.0
98.0
96.0
94.0
92.0
90.0
MADISON STREET
LAFAYETTE STREET
WASHINGTON STREET
El 100.0
El 98.0
El 96.0
Sta 0+0
Sta 5+0
Sta 10+0

FRANKLIN STREET

STANDARD PROFILE PLATE A 4x20
KEUFFEL & ESSER Co NEW YORK

STANDARD PROFILE PLATE A 4x20
KEUFFEL & ESSER Co NEW YORK


Lafayette Street
Franklin Street
Corporate Limit
El 940
El 920
El 900
El 880
Sta 10+0
Sta 15+0
Sta 20+0
Sta 23+40
Washington Street
Jefferson Street
Adams Street
El 1000
El 980
El 960
Franklin Street
Adams Street
Burlington Tracks
Sta 10+0
Sta 15+0
Sta 17+45

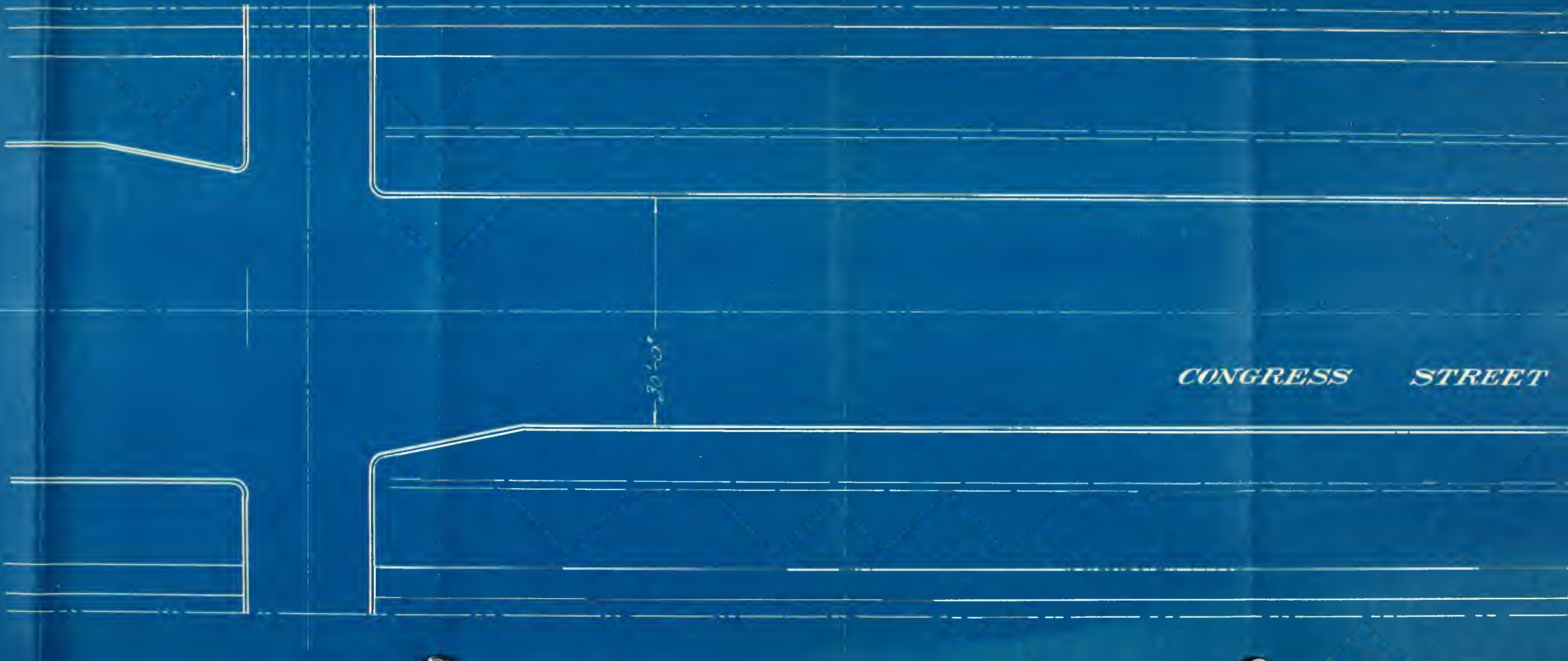
STREET PROFILES
FOR
RUSHVILLE ILLINOIS
FEBRUARY 1914

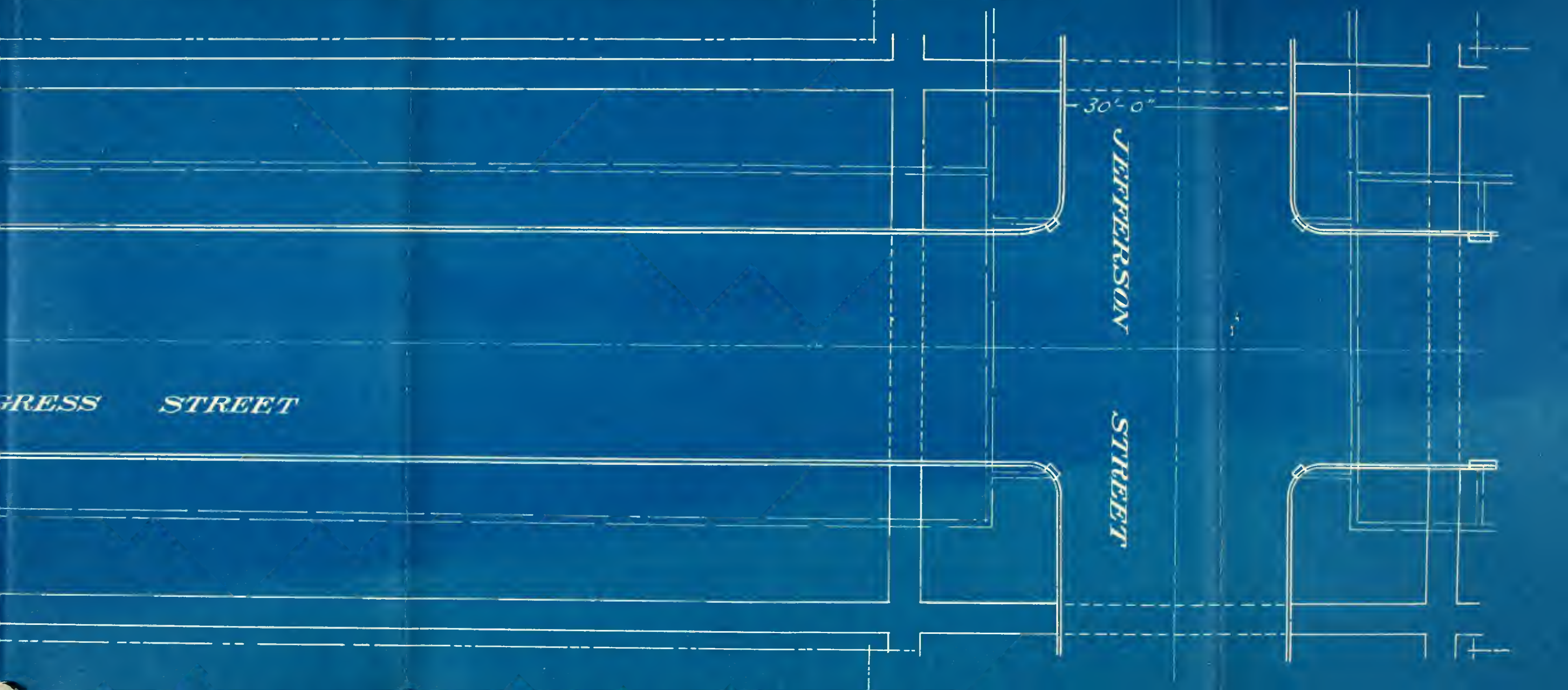
Engineer in Charge

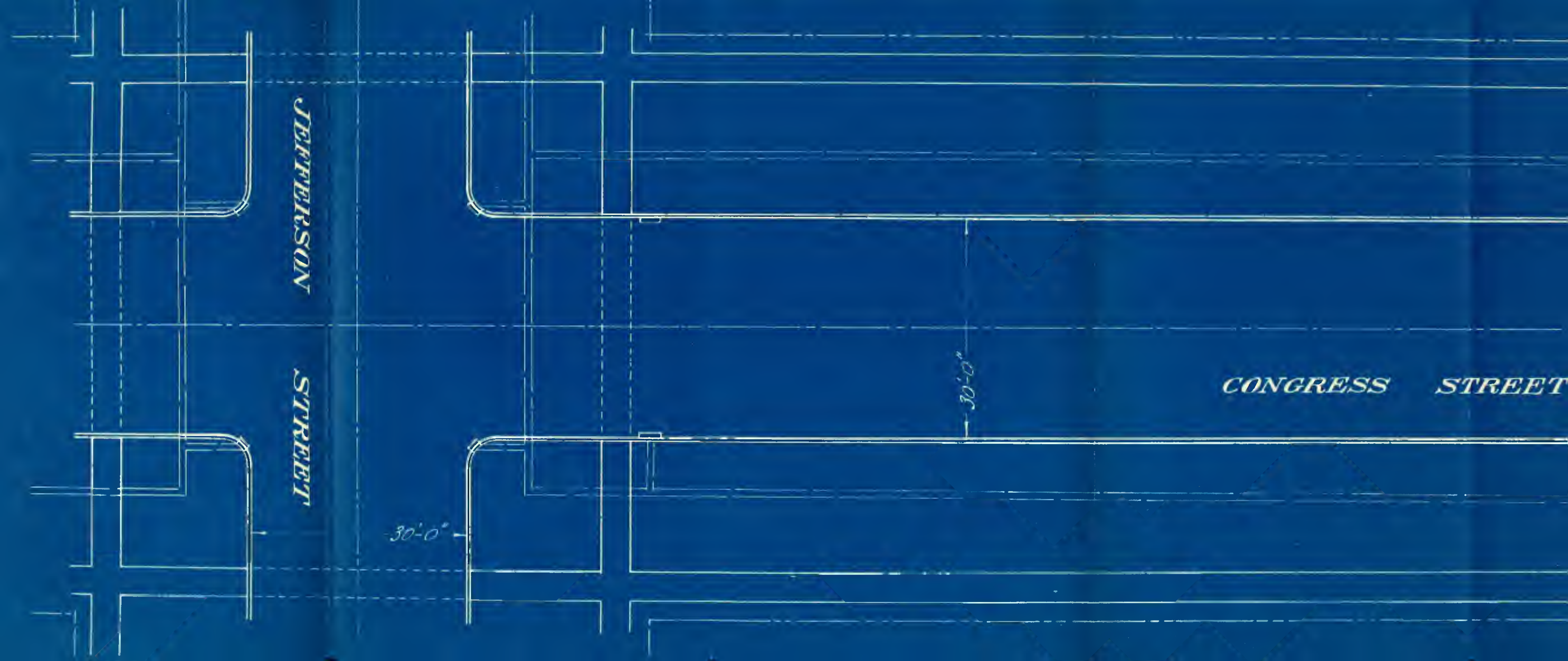
Legend
℄ of Road
East Ditch
West Ditch
West Sidewalk
Street Grade
Ditch Drains

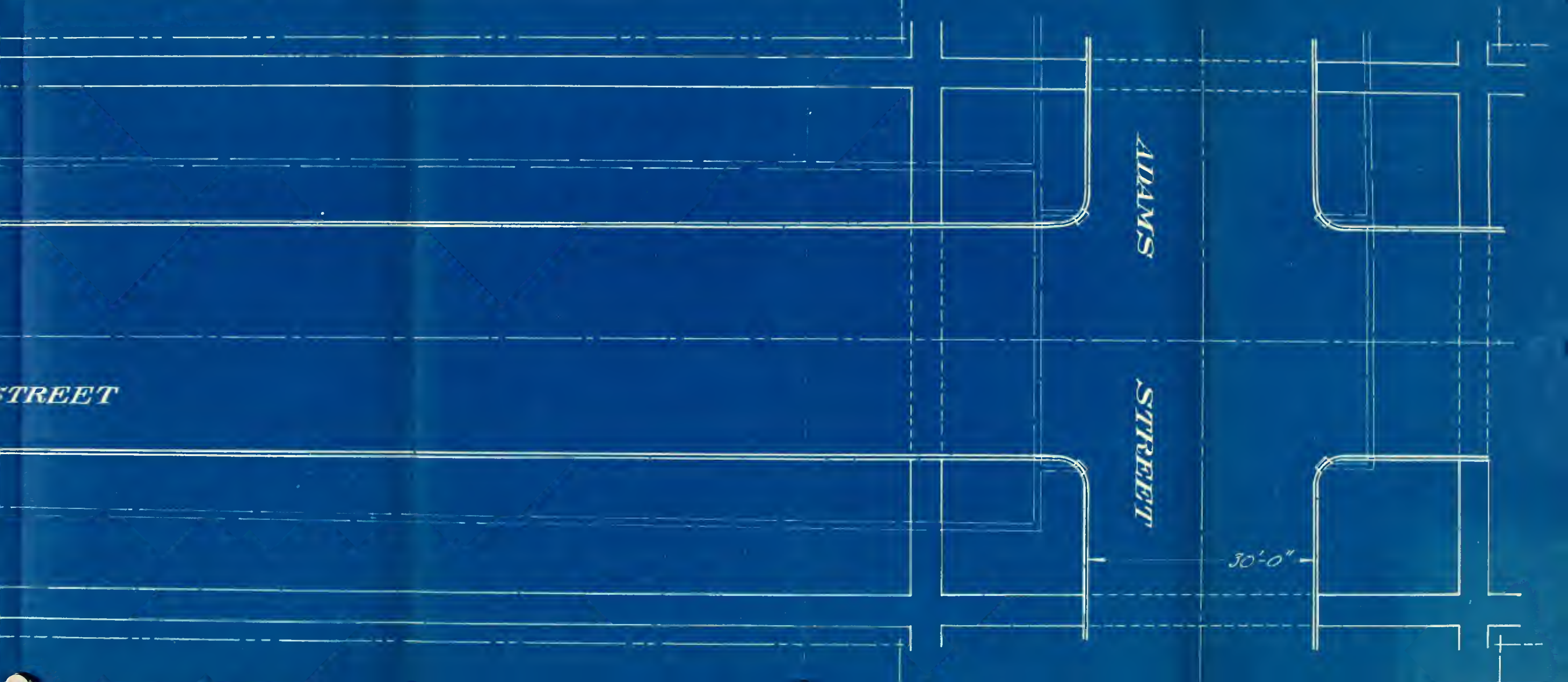
Legend
℄ of Road
North Ditch
South Ditch
North Sidewalk
Street Grade
Ditch Drains

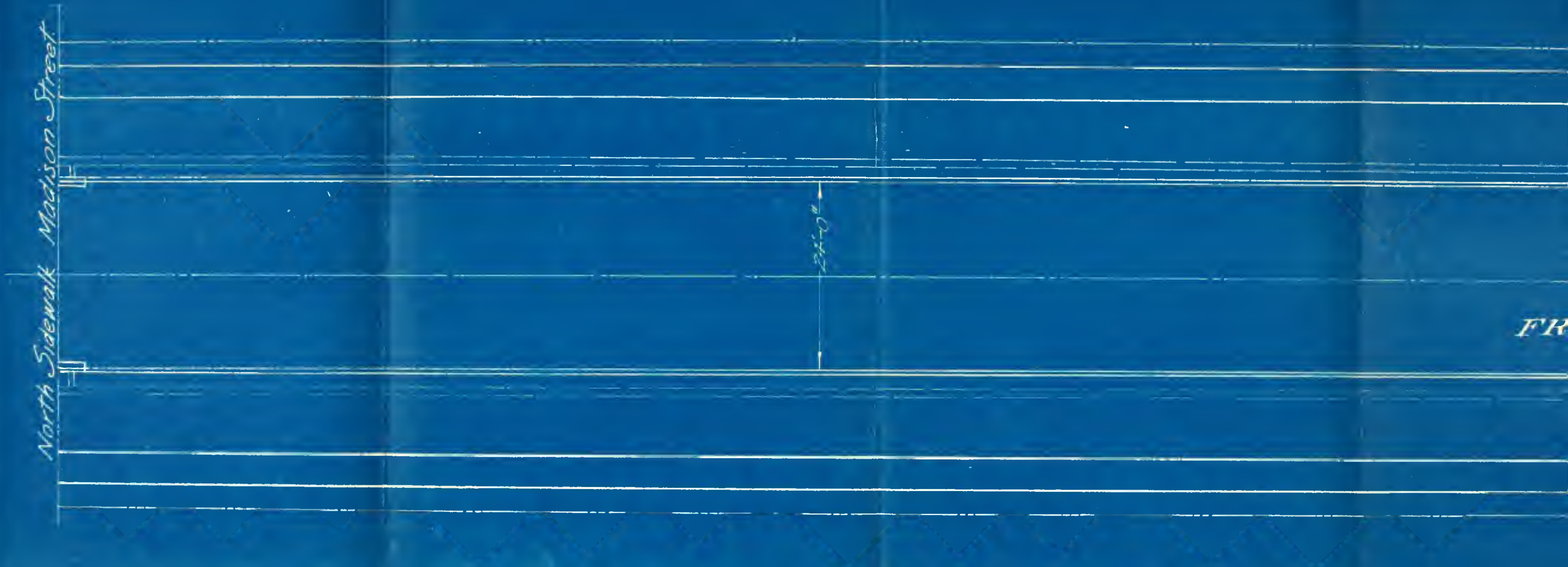
STANDARD PROFILE PLATE A 4X20
KEUFFEL & ESSER NEW YORK


30-0"
CONGRESS STREET

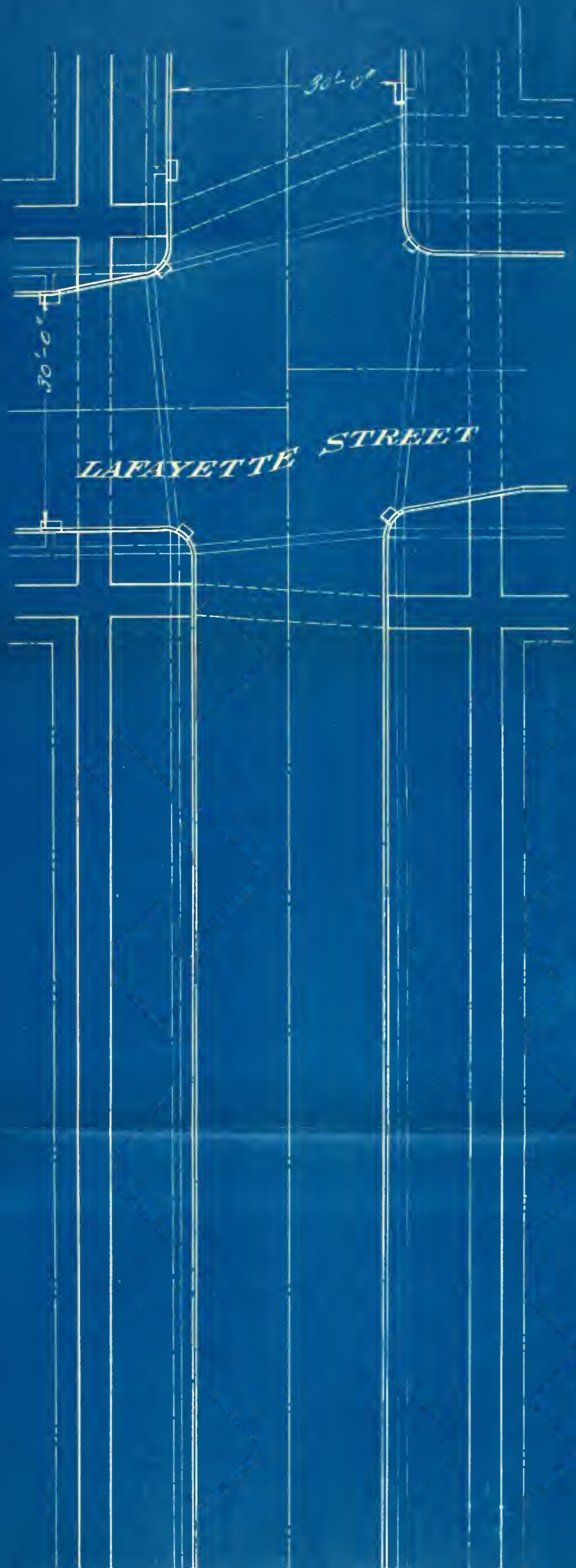

30'-0"
JEFFERSON STREET
GRESS STREET

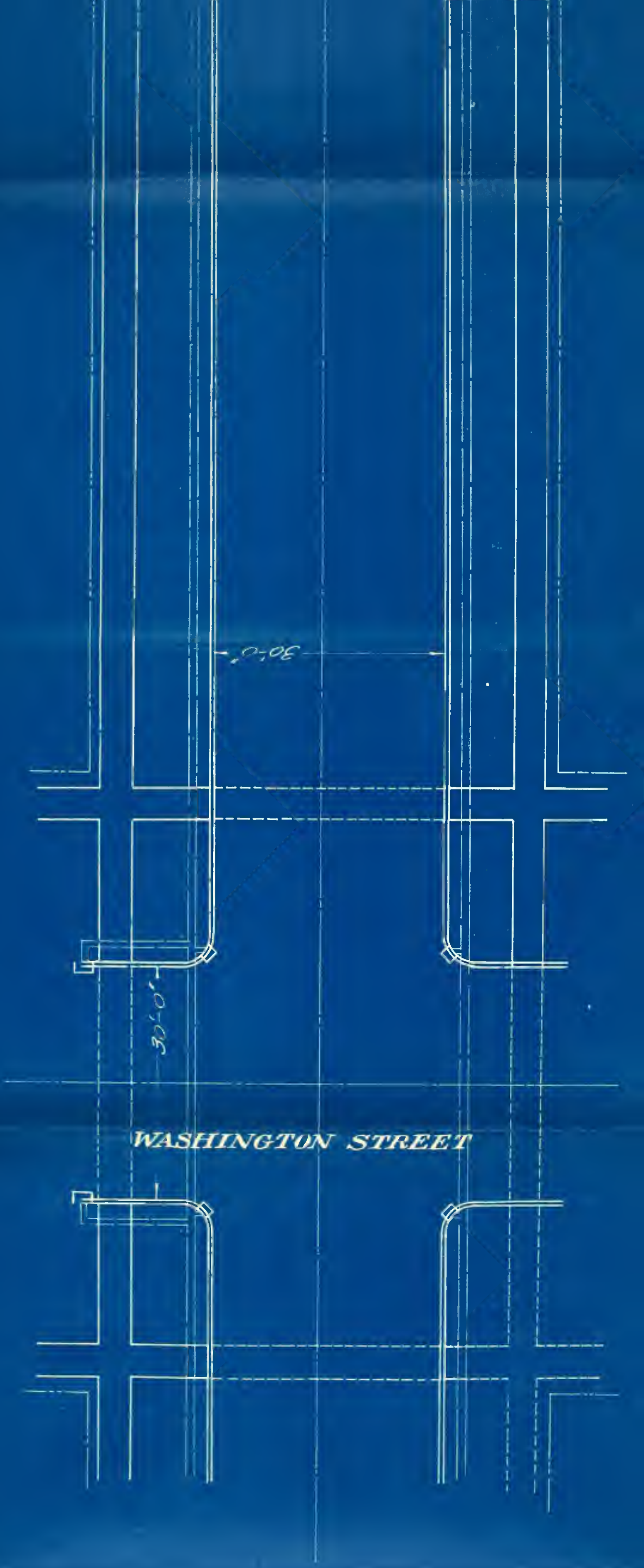

JEFFERSON STREET
CONGRESS STREET
30'-0"
30'-0"

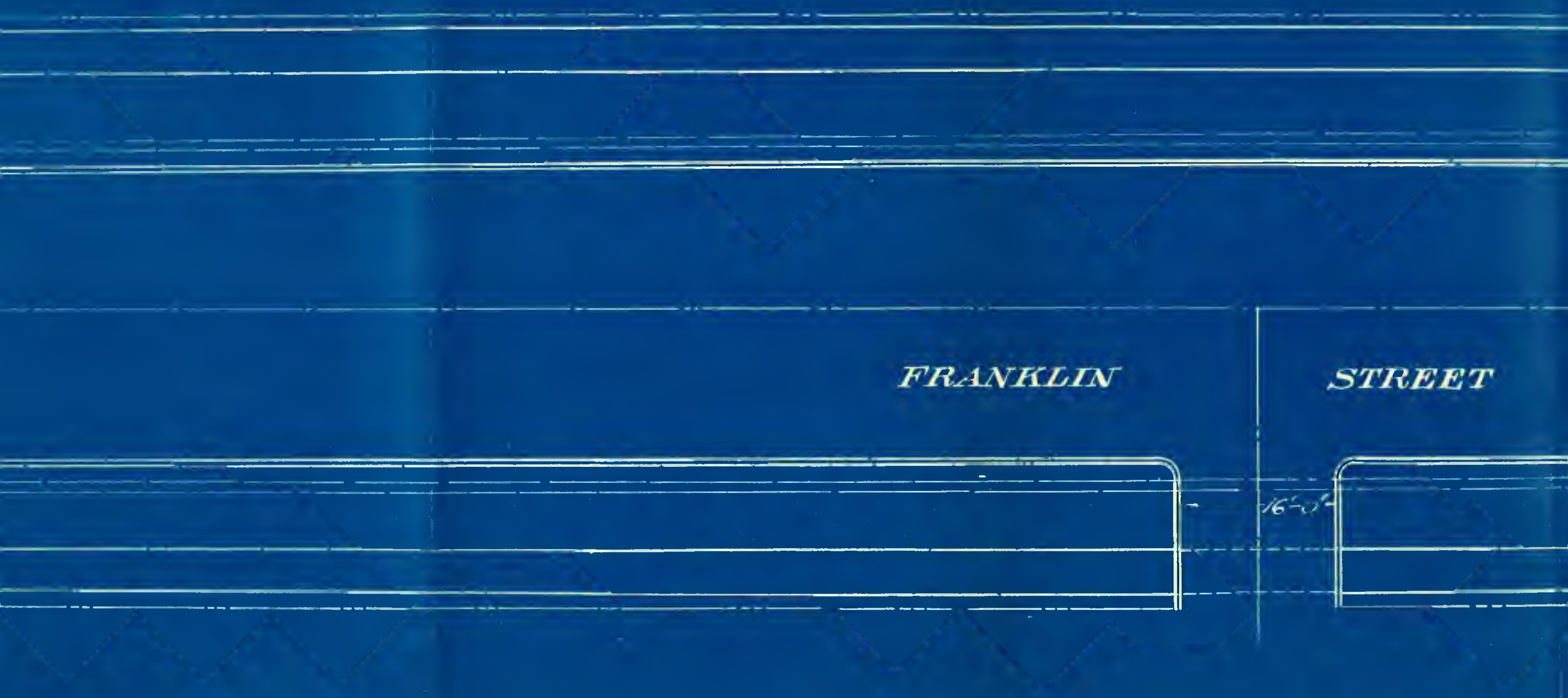

TREET
ADAMS
STREET
30'-0"

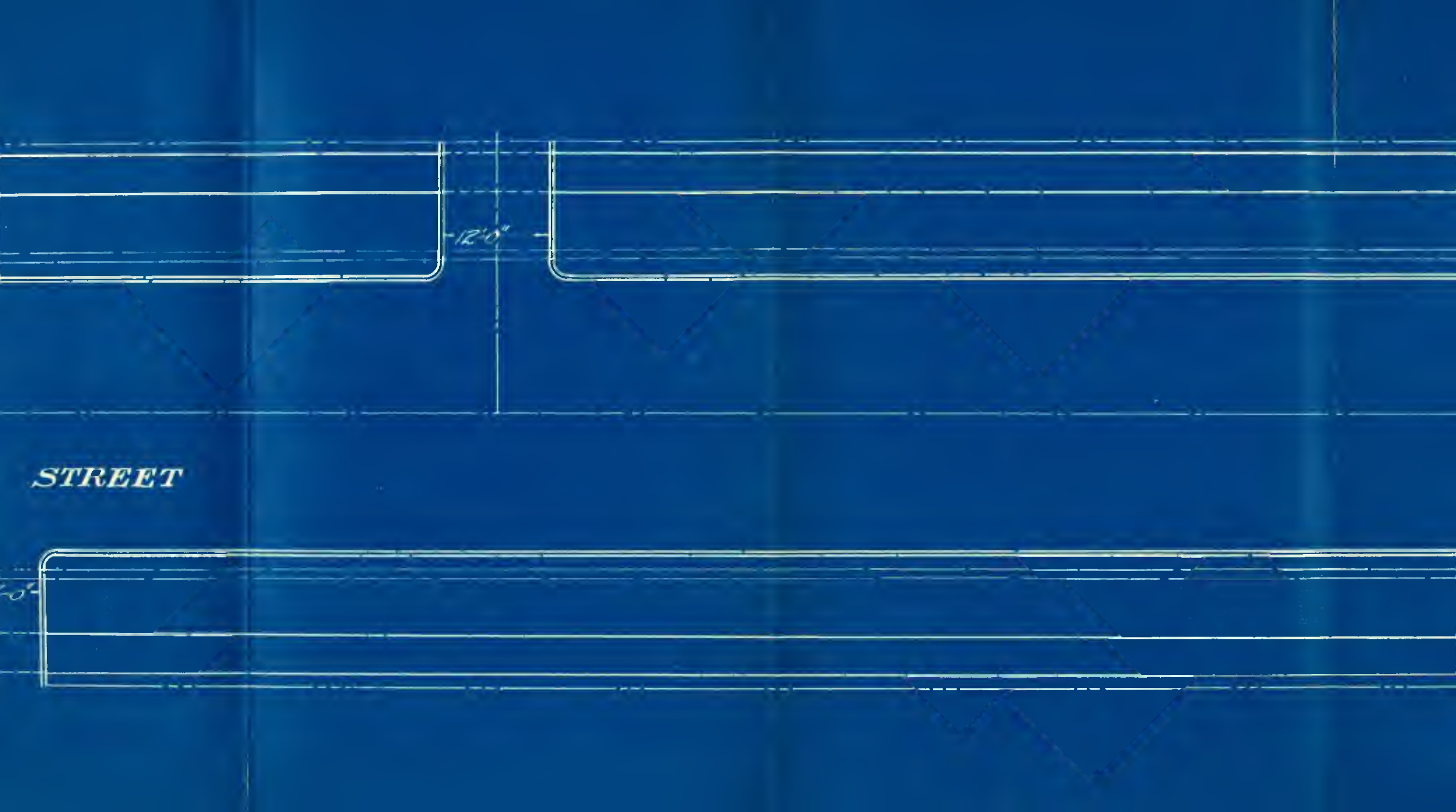

North Sidewalk Madison Street
24'-0"
FR

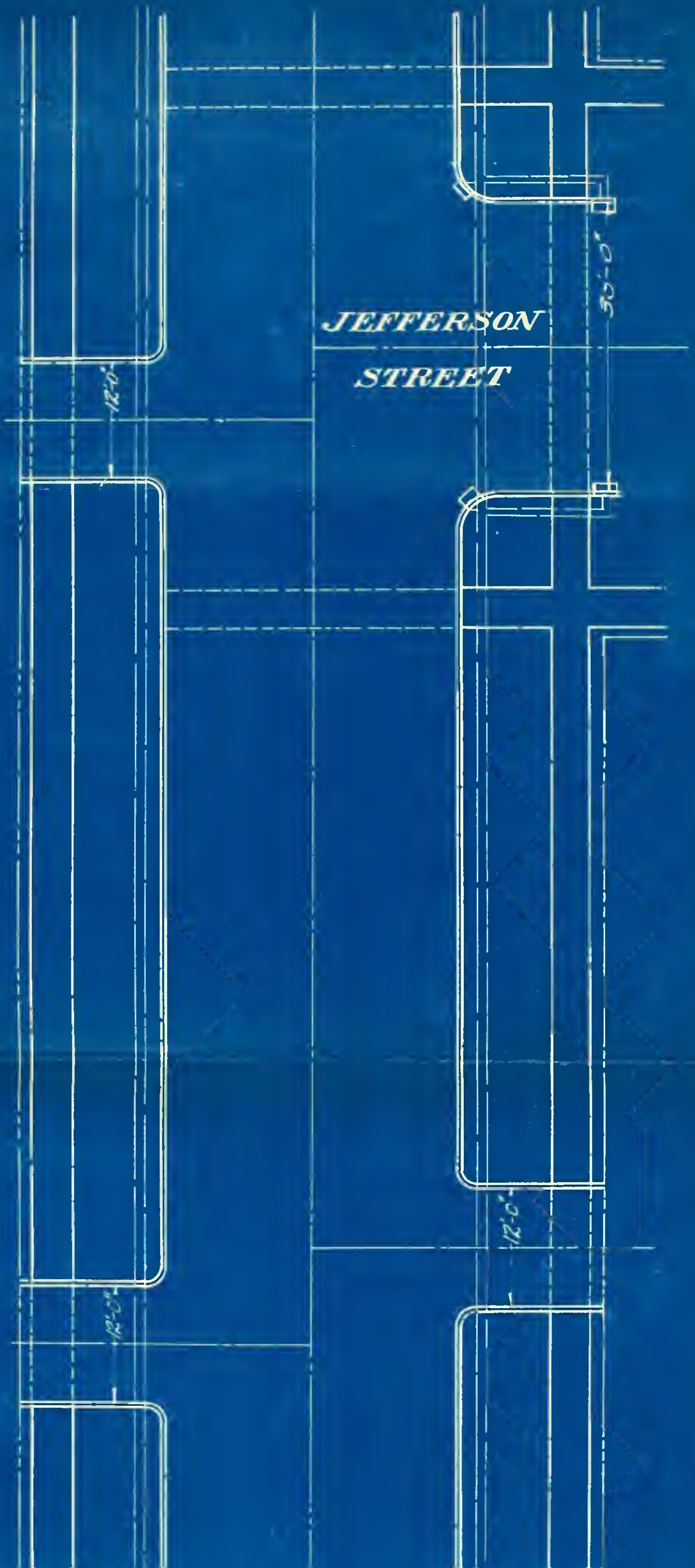
FRANKLIN
STREET
12'-0"


30'-0"
30'-0"
LAFAYETTE STREET

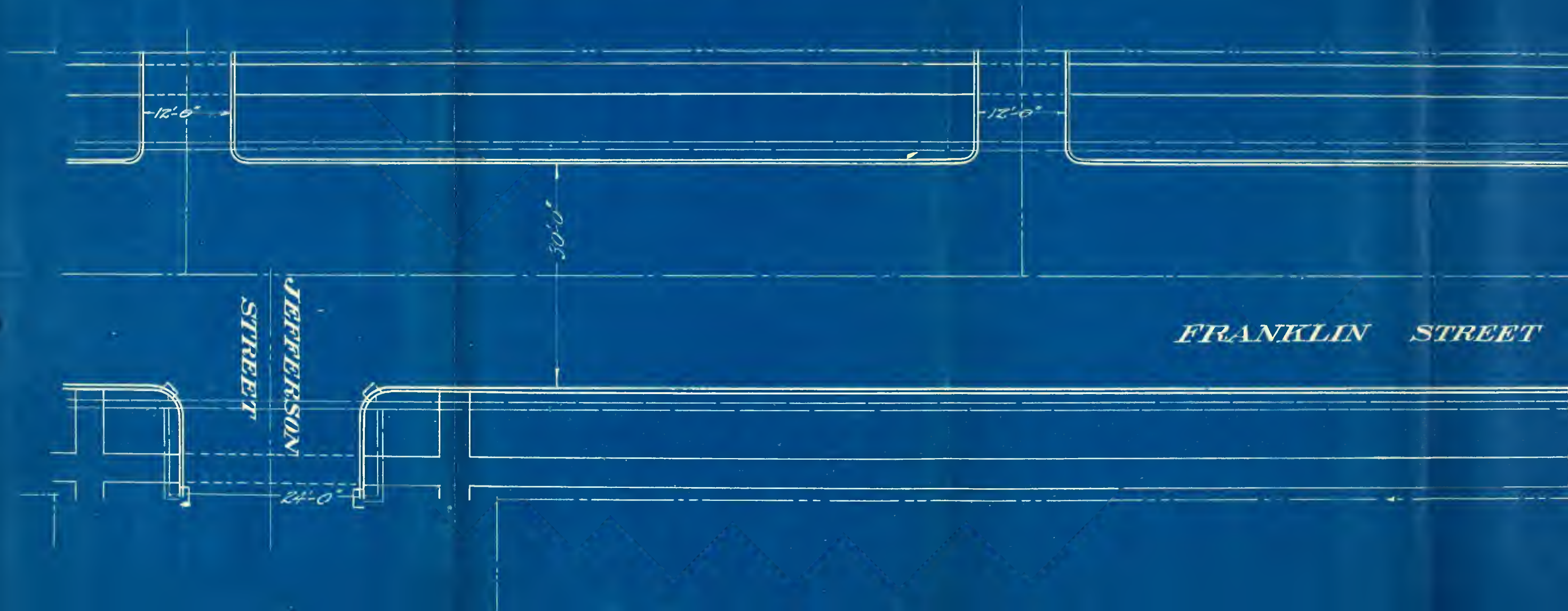

30'-0"
30'-0"
WASHINGTON STREET

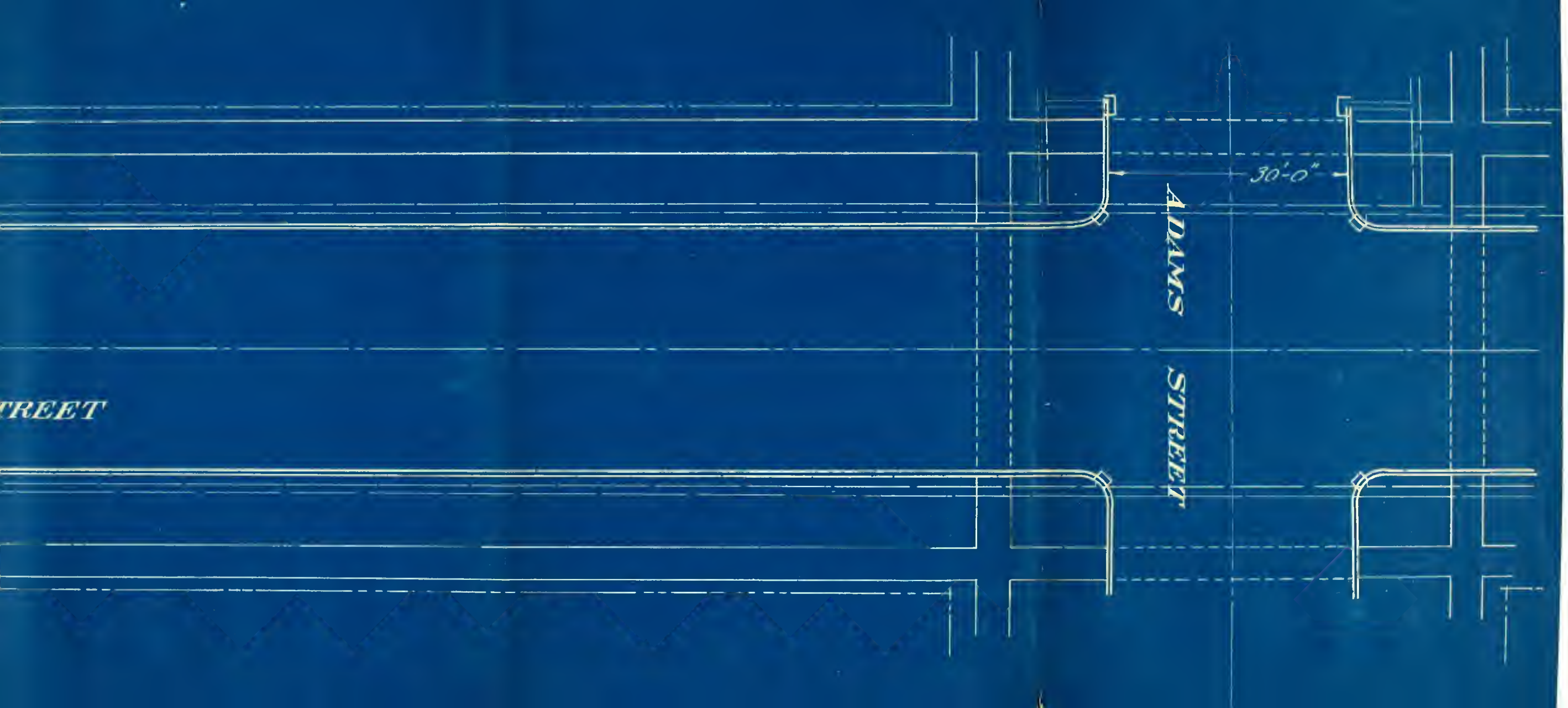

FRANKLIN
STREET
16'-0"

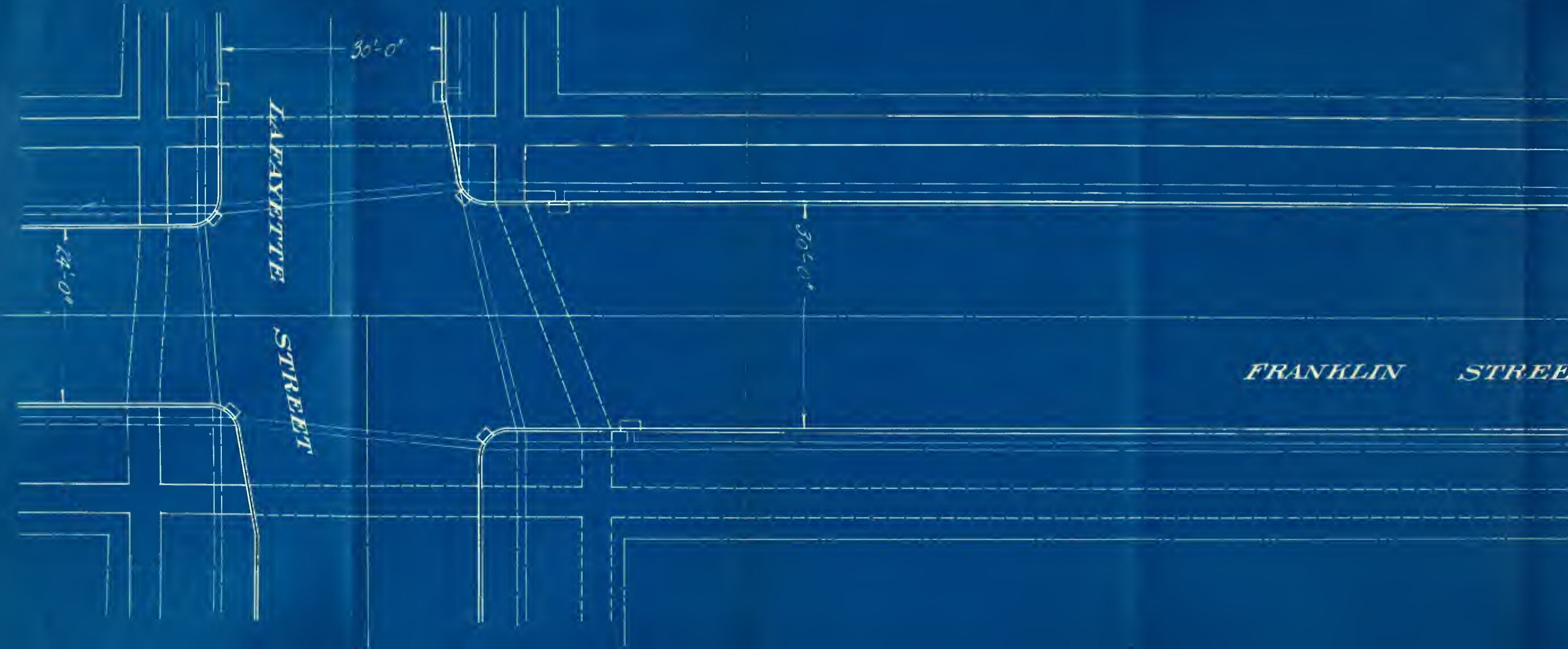

12'0"
STREET

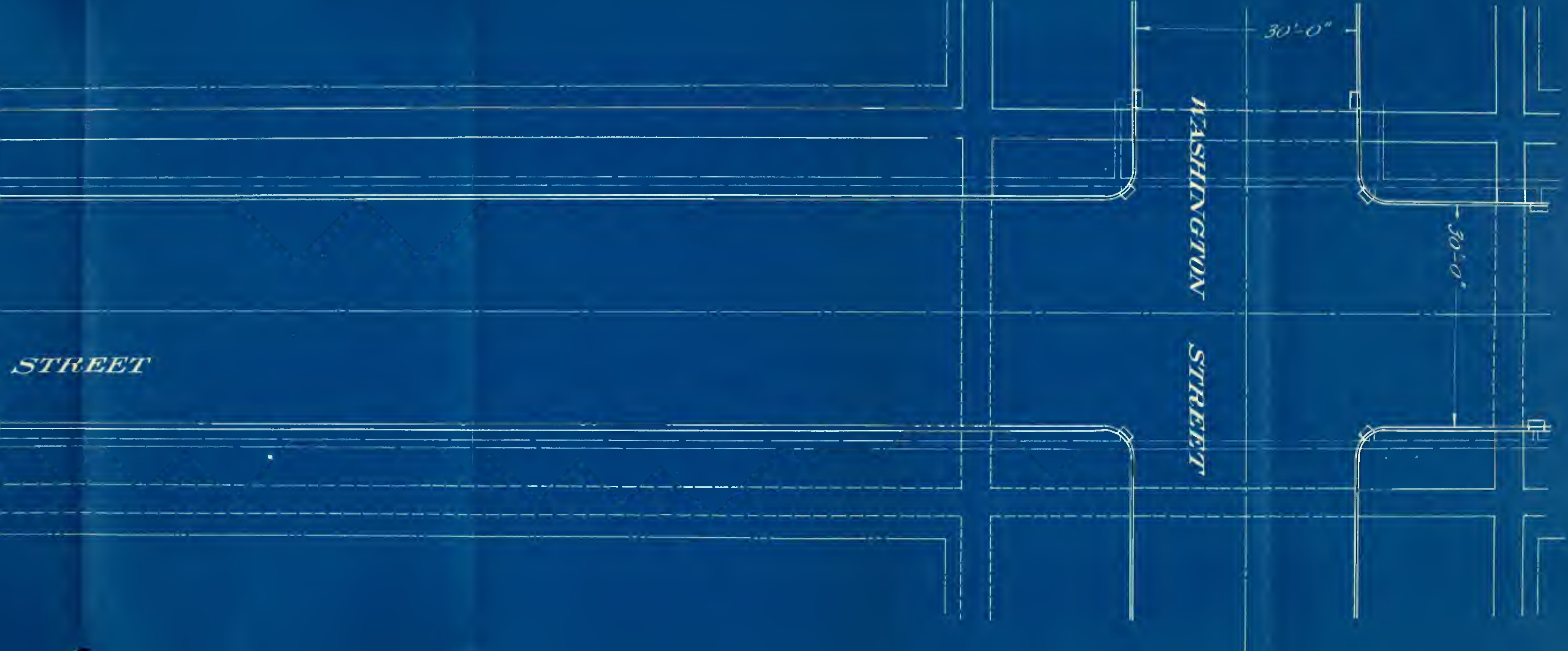


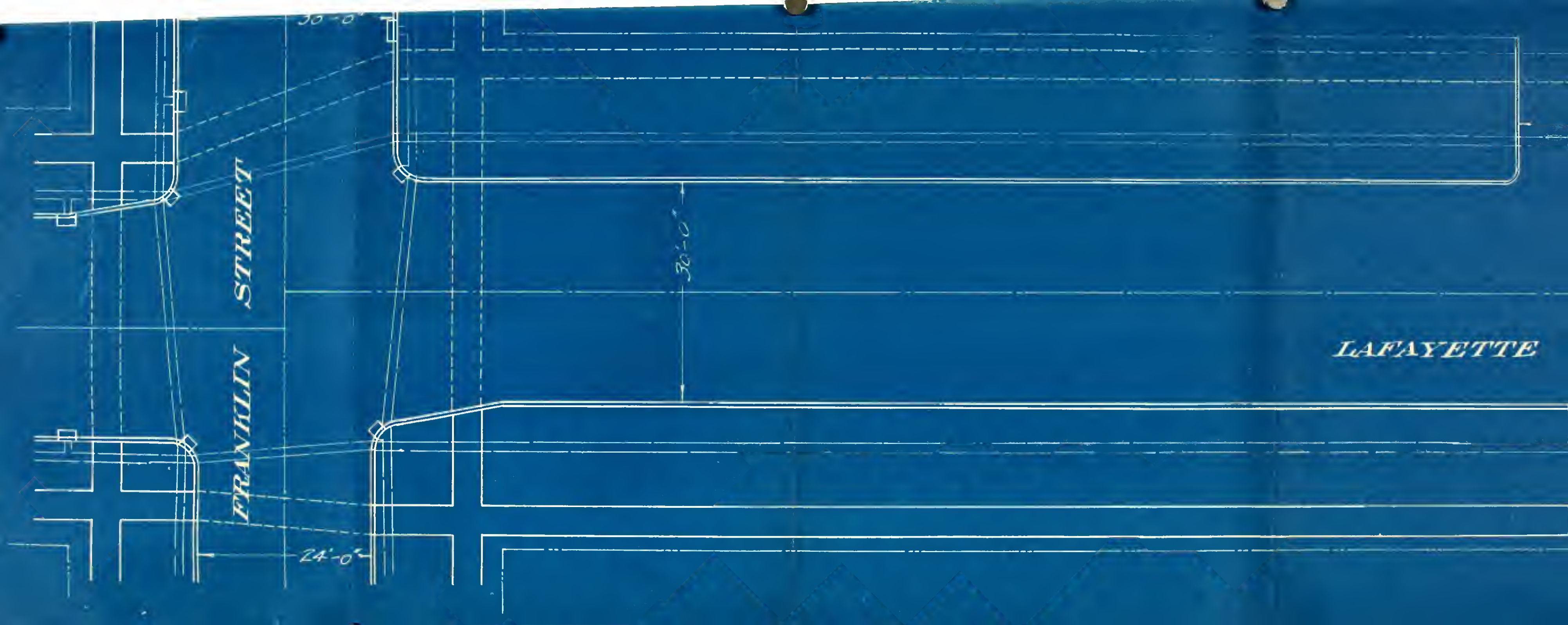
JEFFERSON STREET
30'-0"
12'-0"
12'-0"
12'-0"


12'-6"
12'-6"
30'-0"
JEFFERSON STREET
FRANKLIN STREET
24'-0"


TREET
ADAMS STREET
30'-0"


30'-0"
LAFAYETTE
STREET
24'-0"
30'-0"
FRANKLIN STREE

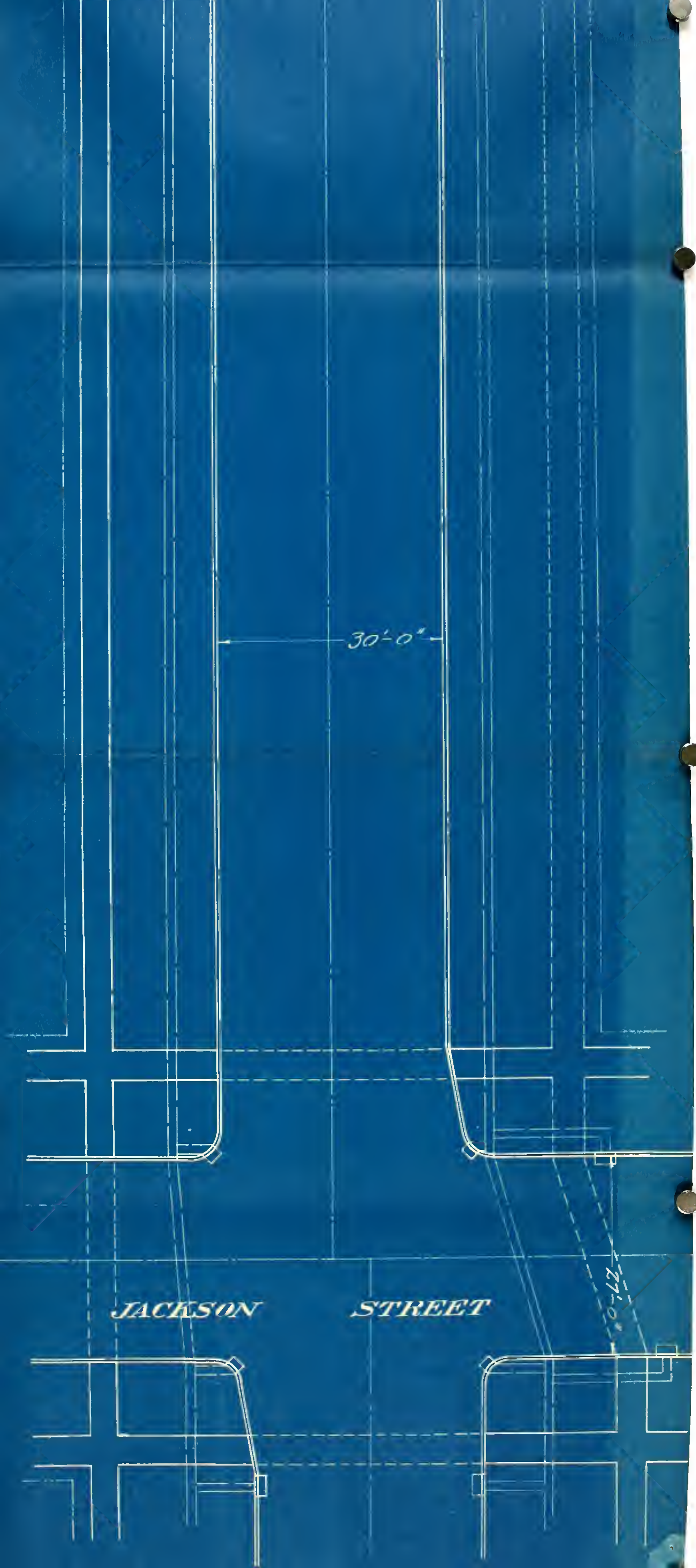

30'-0"
WASHINGTON STREET
30'-0"
STREET

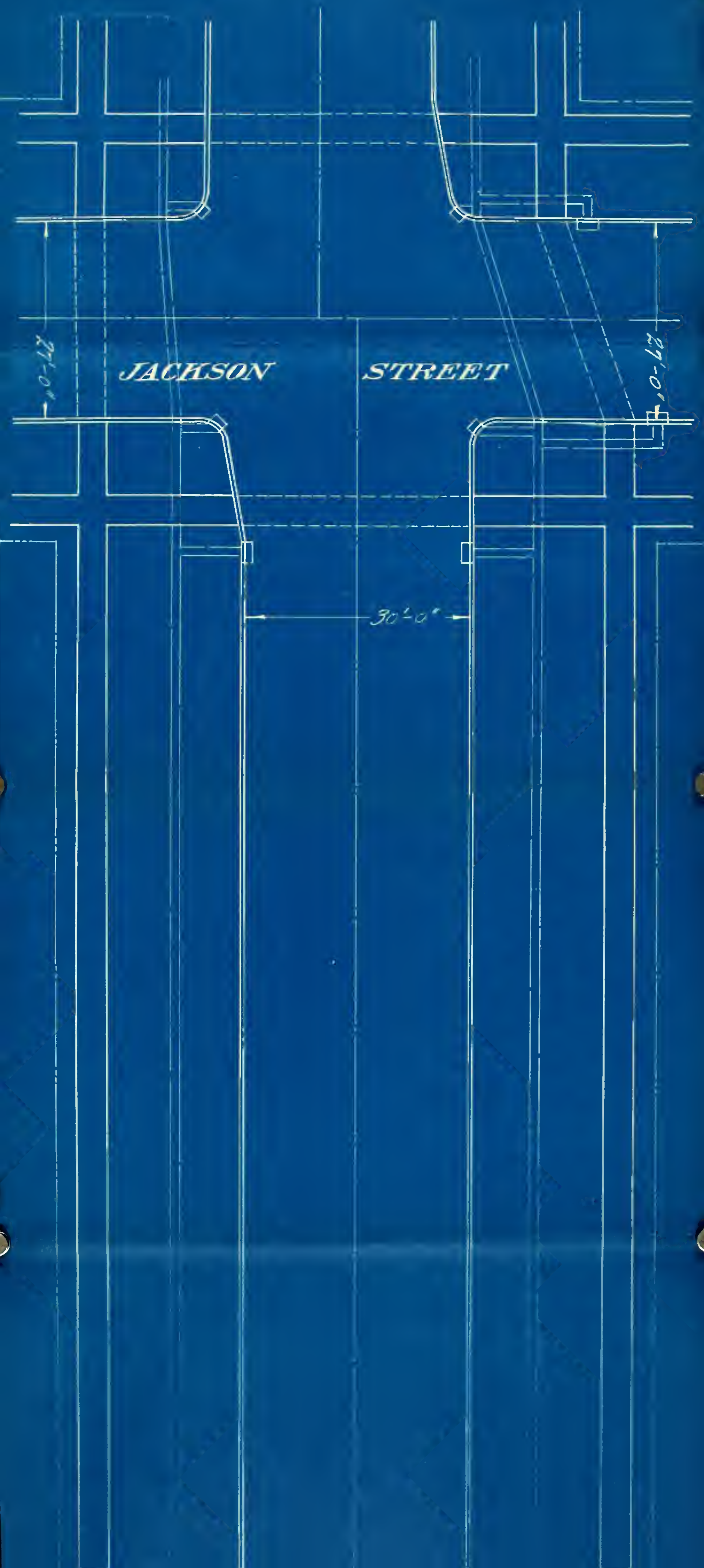

FRANKLIN STREET
30'-0"
24'-0"
LAFAYETTE

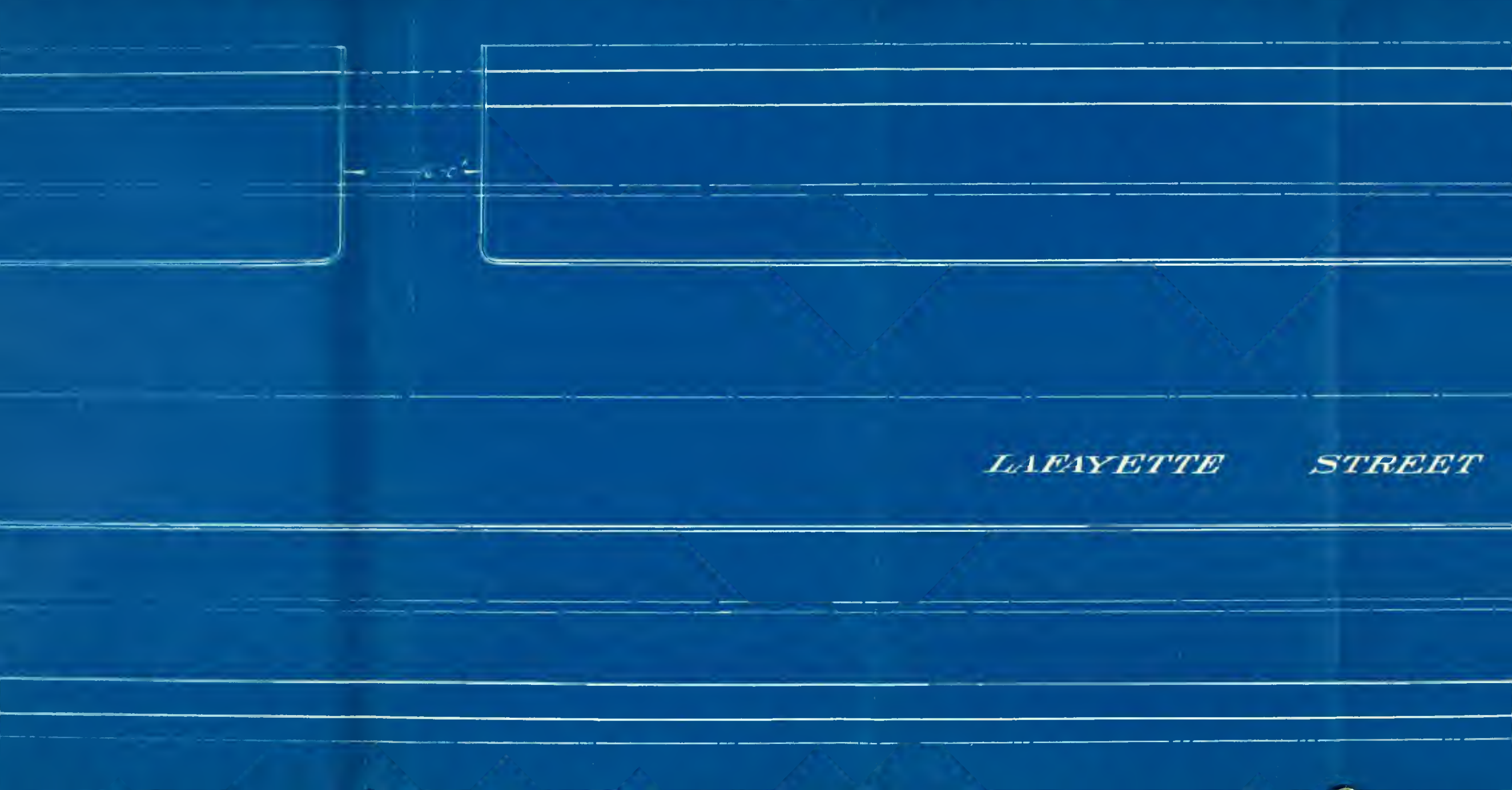
16'-0"
LAFAYETTE STREET

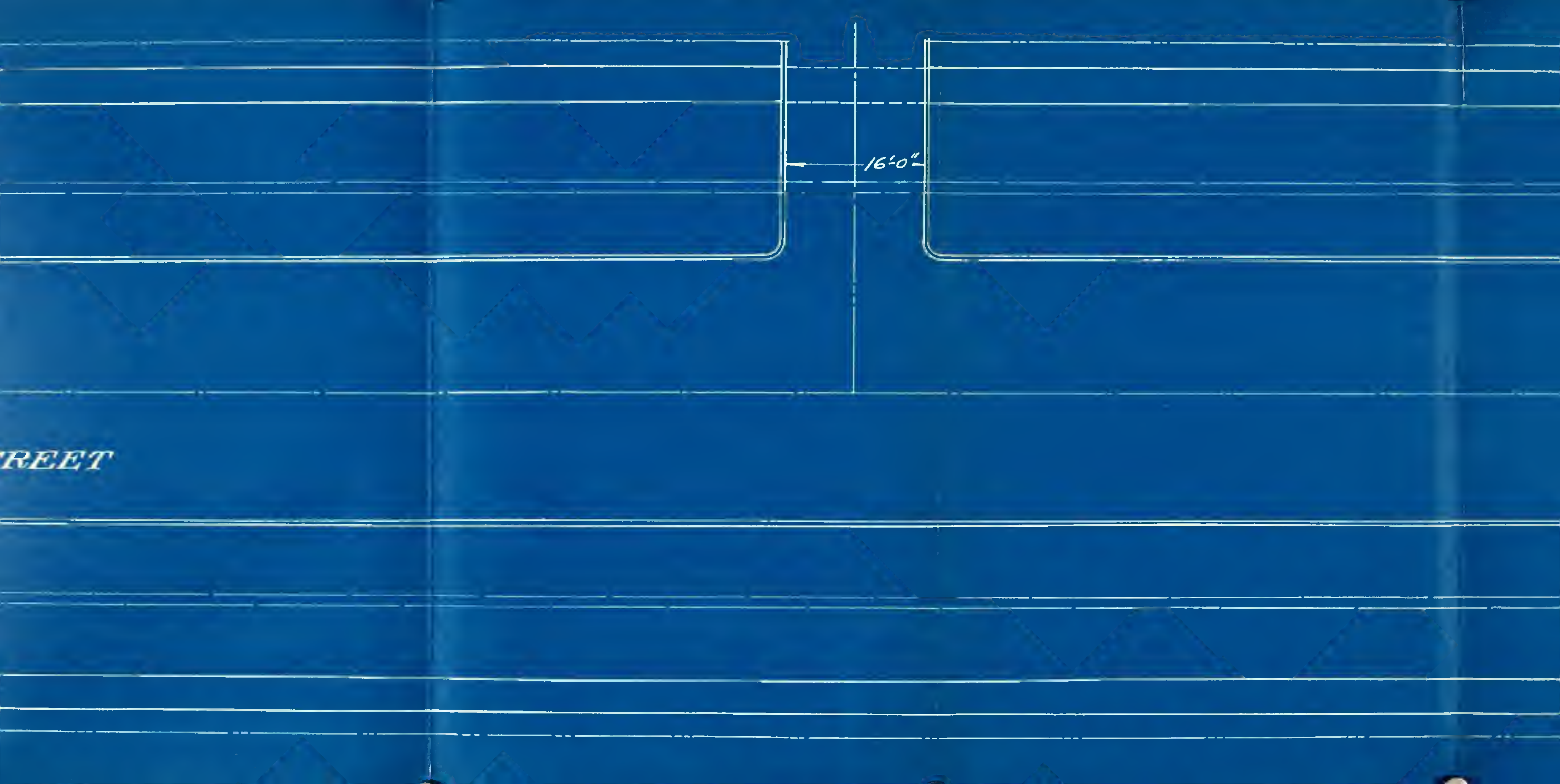
30'-0"

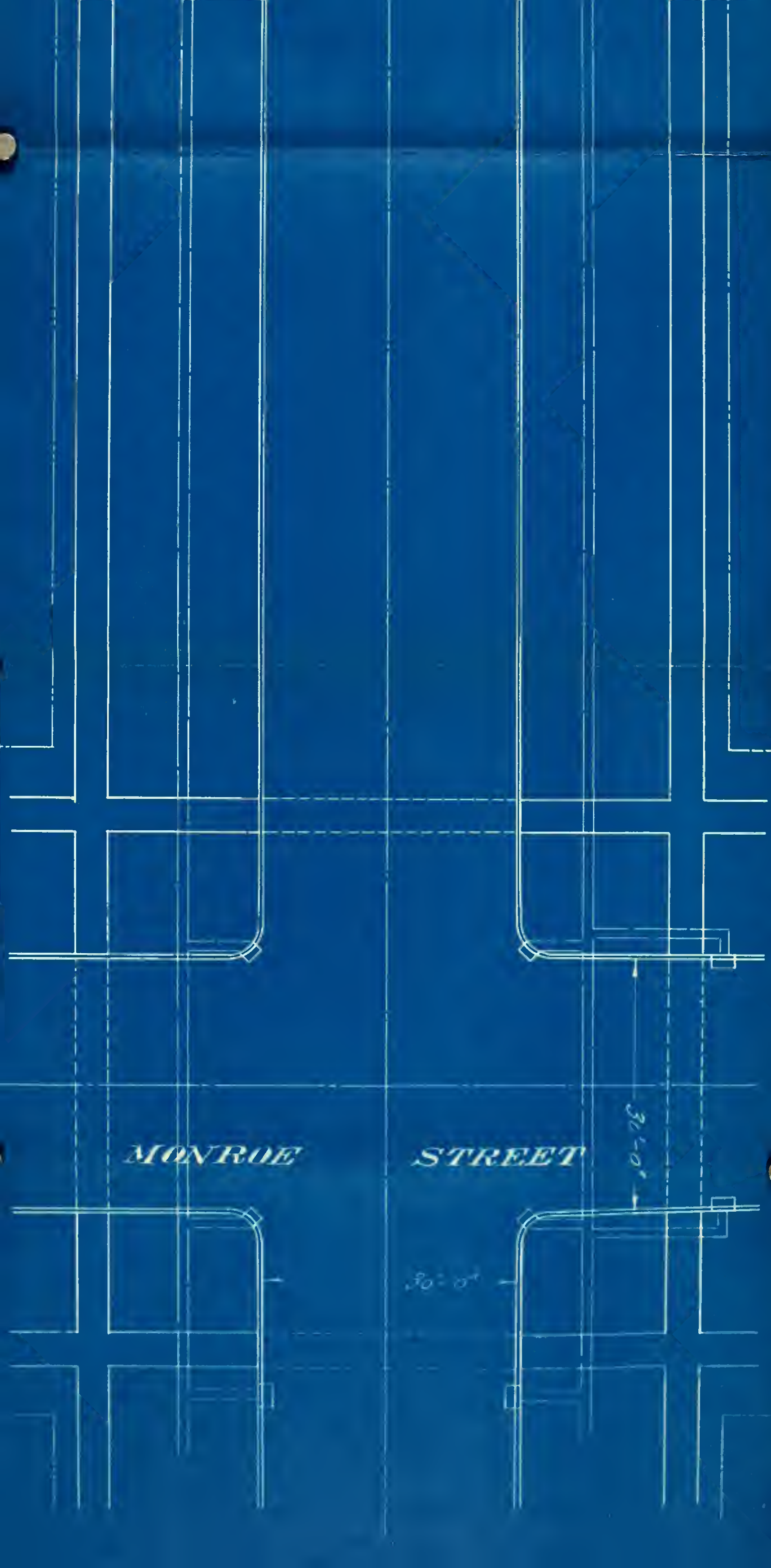
LAFAYETTE STREET

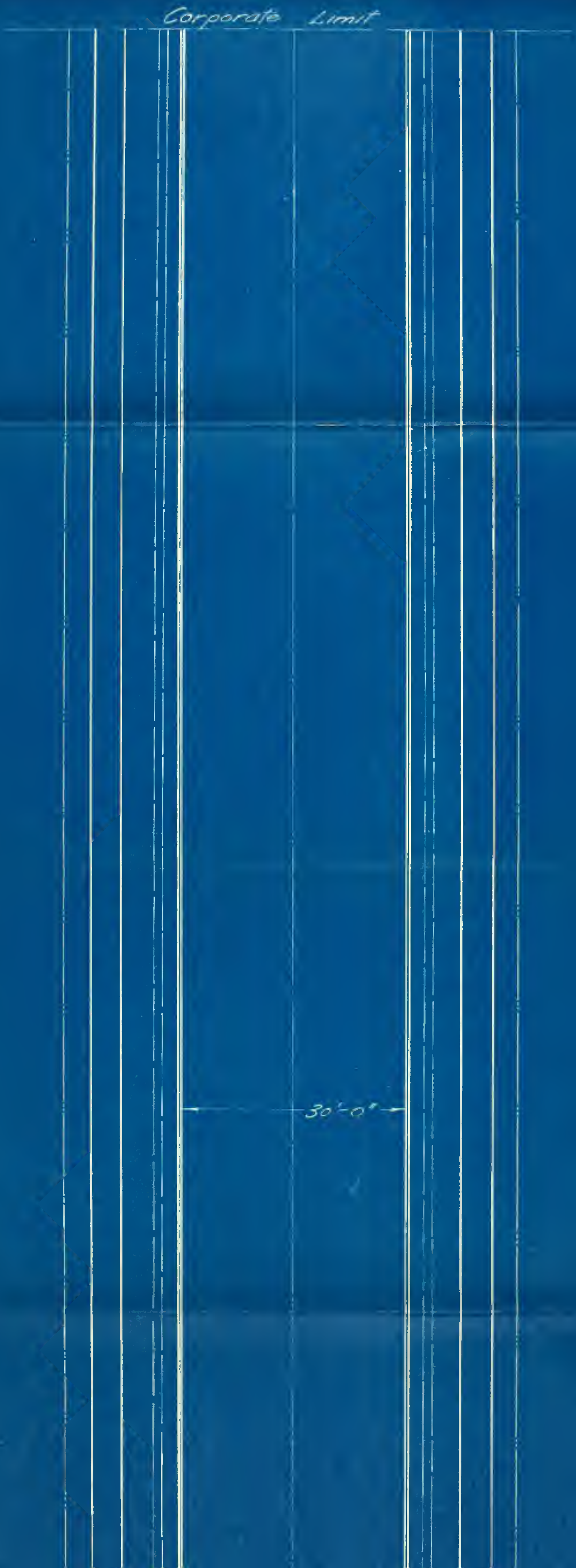

30'-0"
JACKSON STREET
27'-0"

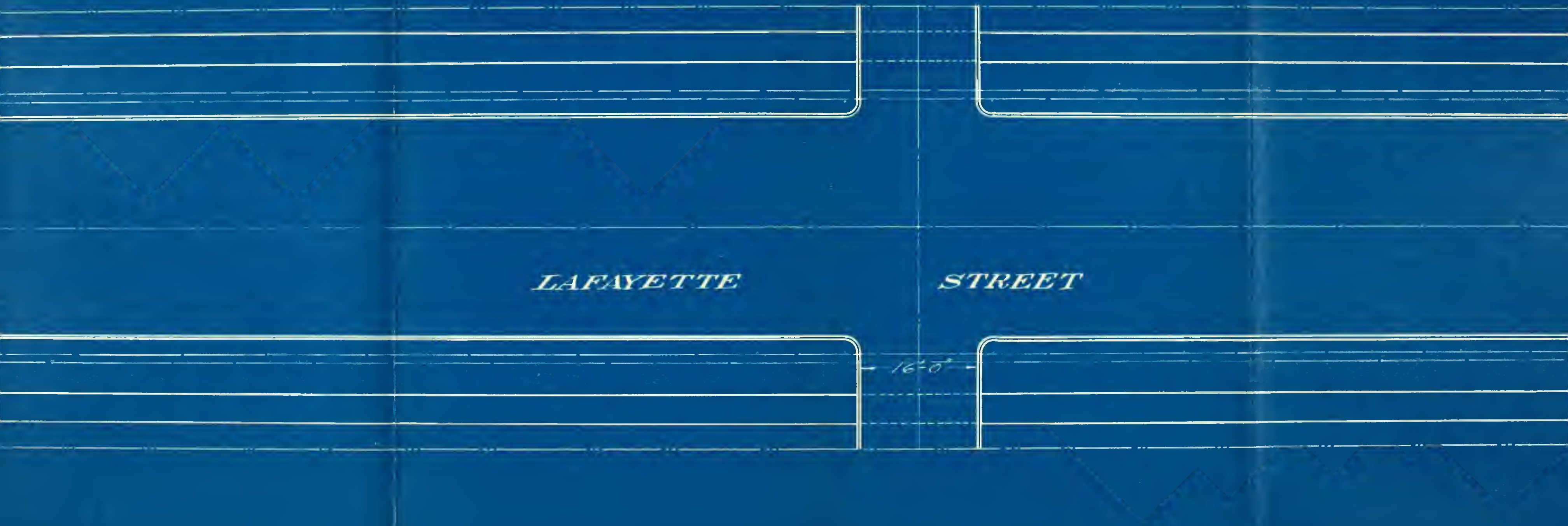

27'-0"
JACKSON STREET
27'-0"
30'-0"

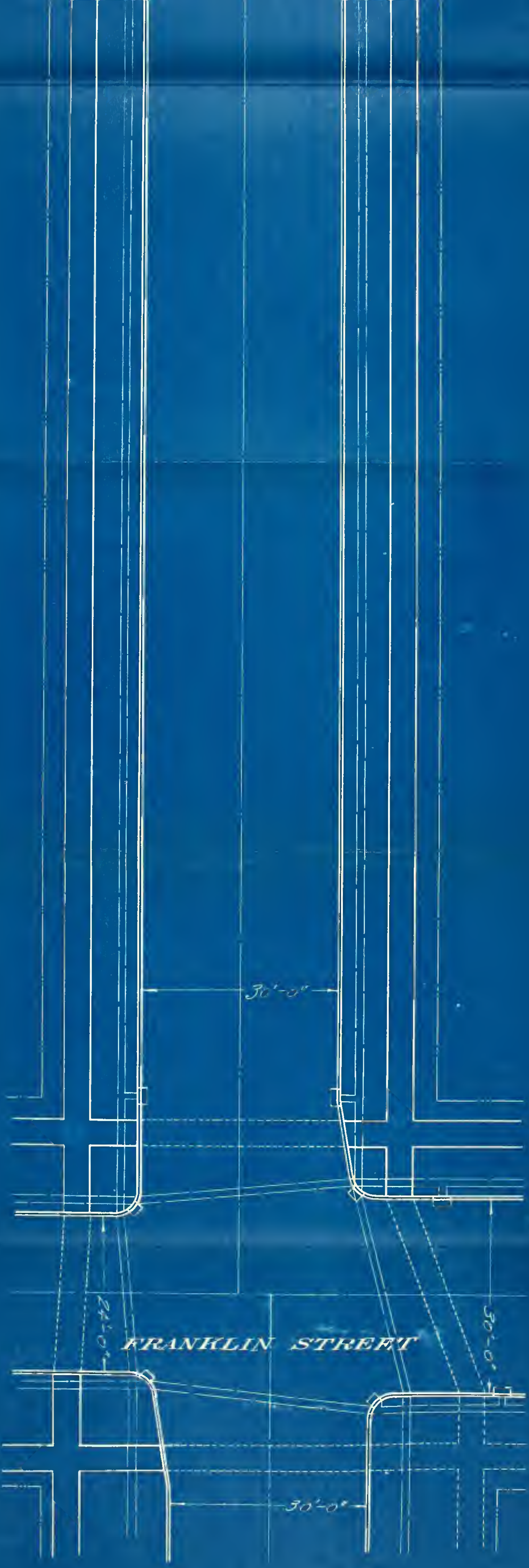

LAFAYETTE STREET

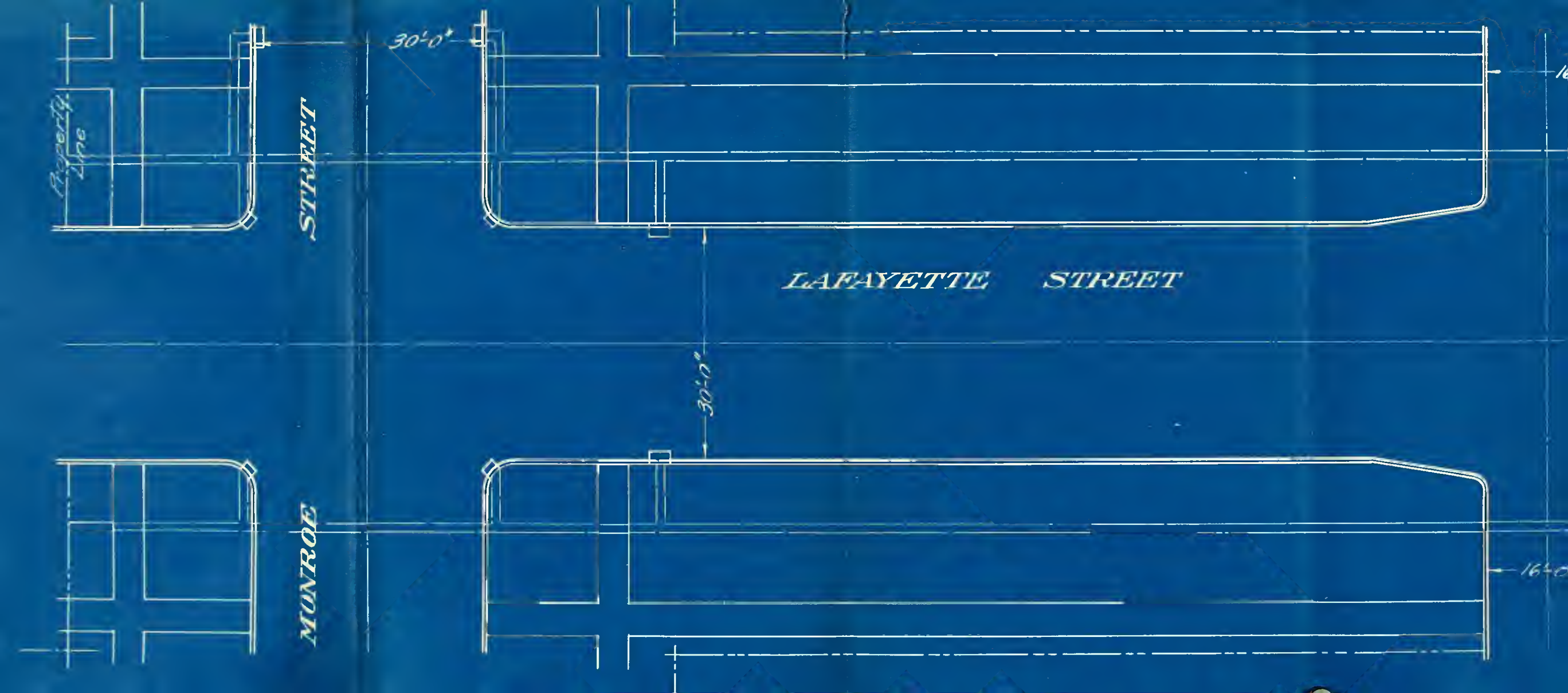

16'-0"
REET

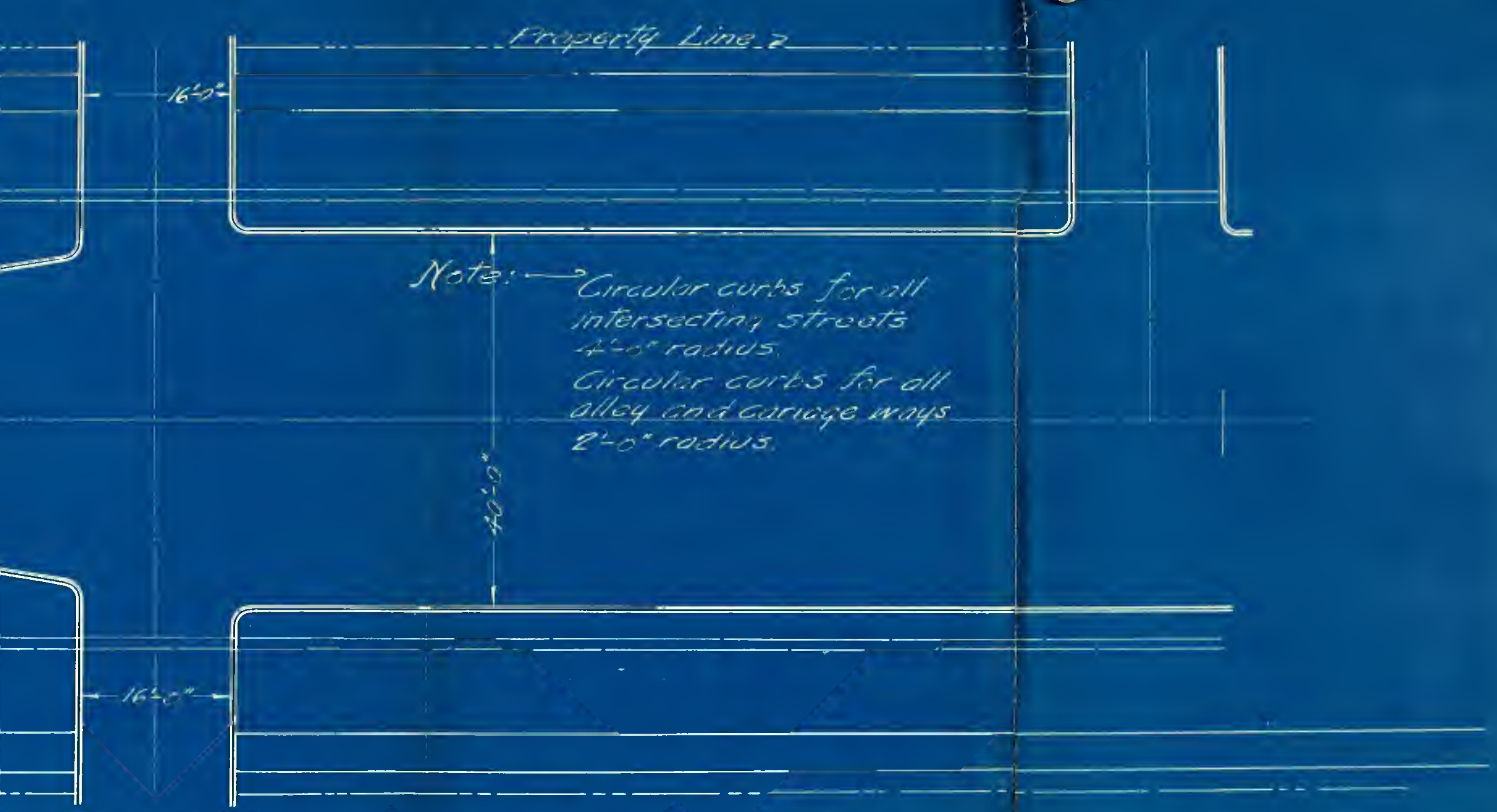

MONROE STREET
30'-0"
30'-0"


Corporate Limit
30'-0"

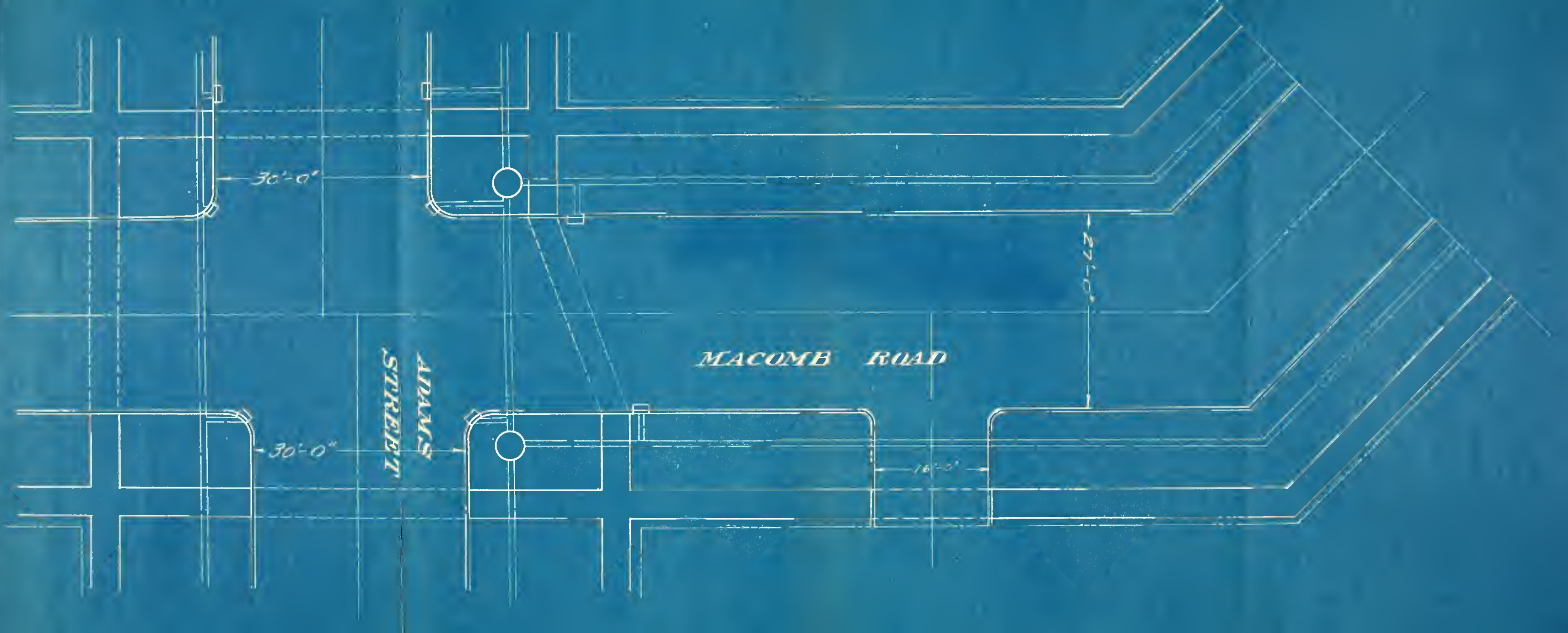

LAFAYETTE STREET
16'-0"


30'-0"
24'-0"
FRANKLIN STREET
30'-0"
30'-0"

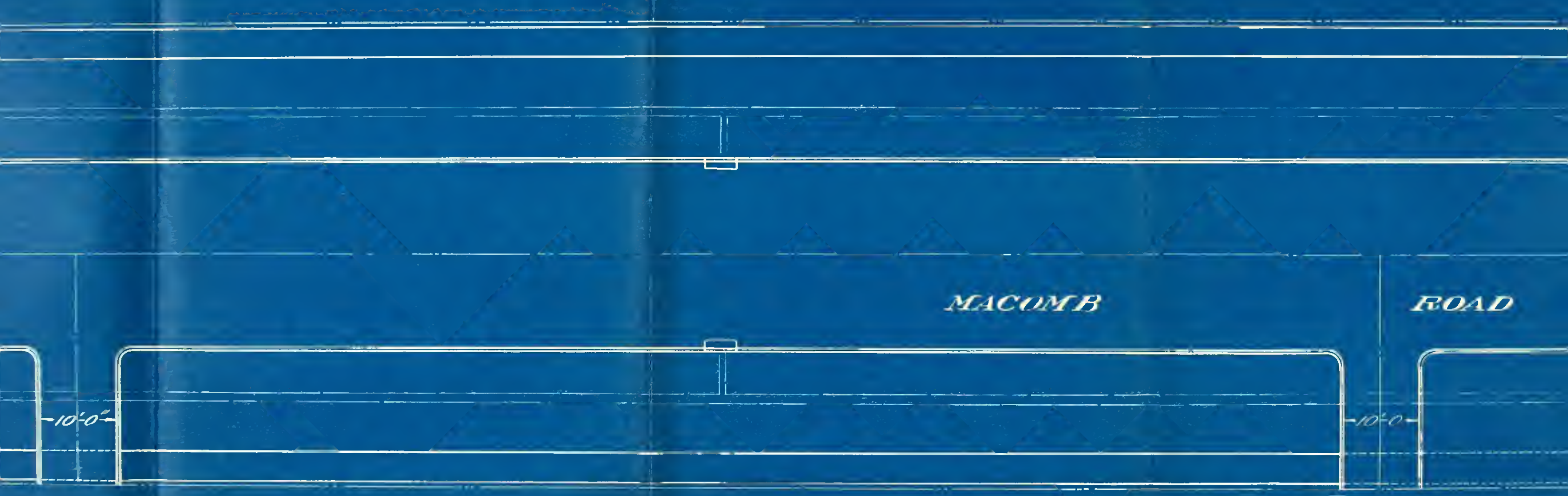

Property Line
30'-0"
STREET
MONROE
LAFAYETTE STREET
30'-0"
16'-0"

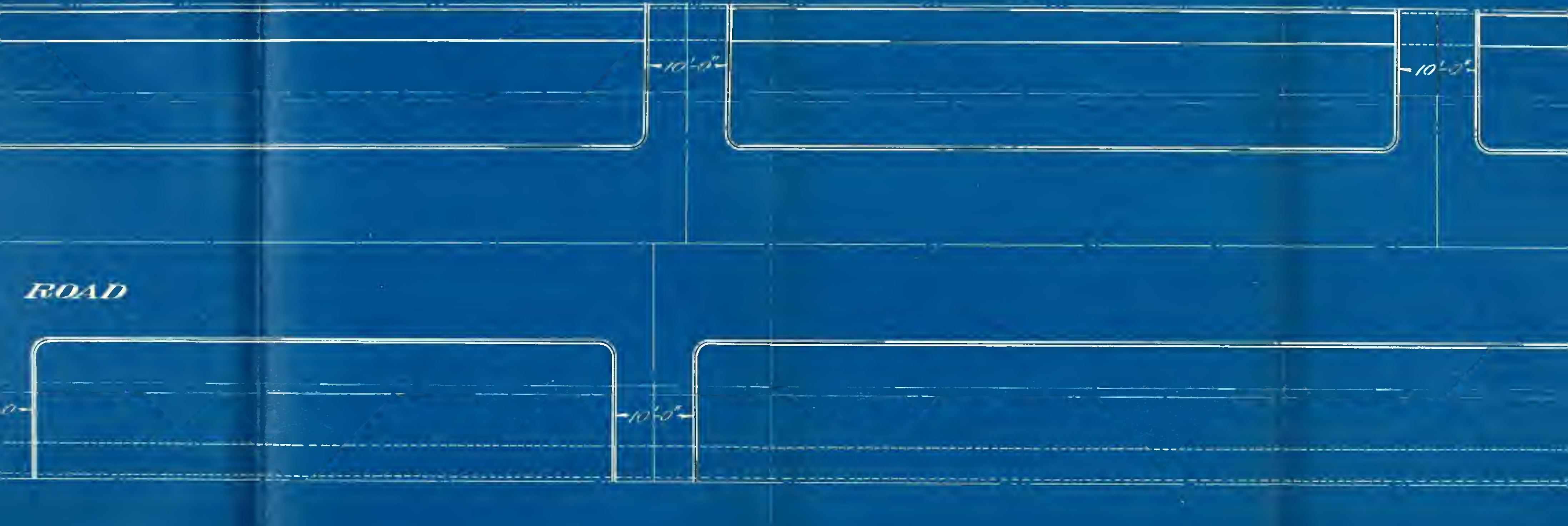

Property Line
16'-0"
40'-0"
16'-0"

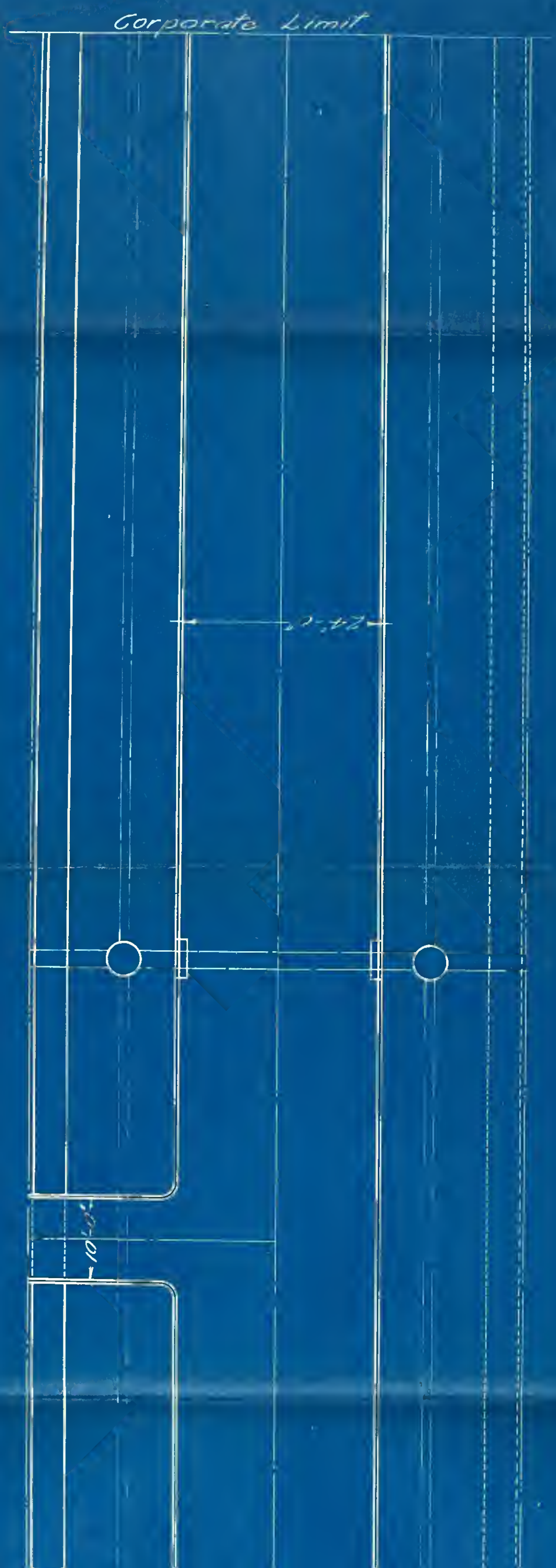
Note: → Circular curbs for all intersecting streets 4'-0" radius.
Circular curbs for all alley and cariage ways 2'-0" radius.

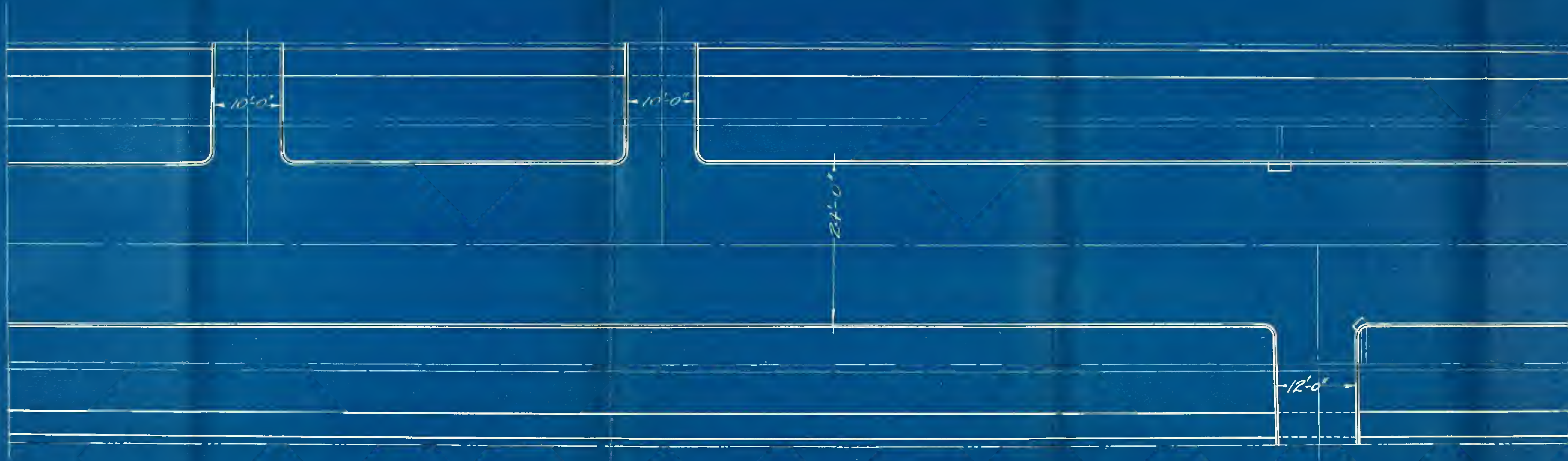

30'-0"
27'-0"
MACOMB ROAD
ADAMS STREET
30'-0"
16'-0"

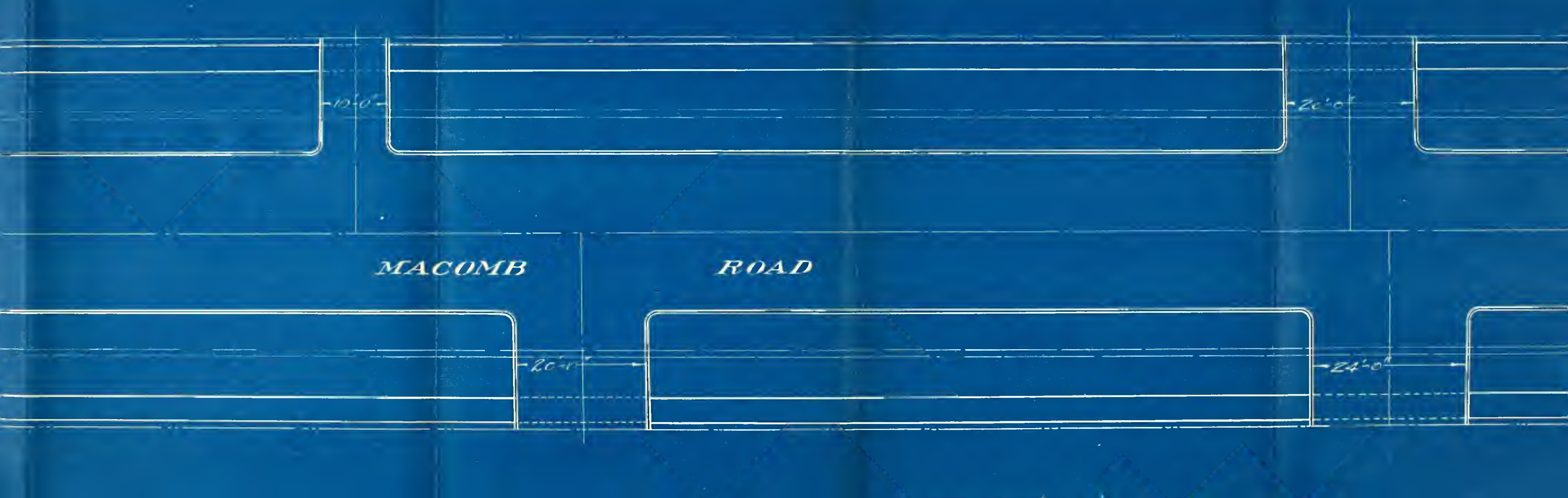
24'-0"
10'-0"
10'-

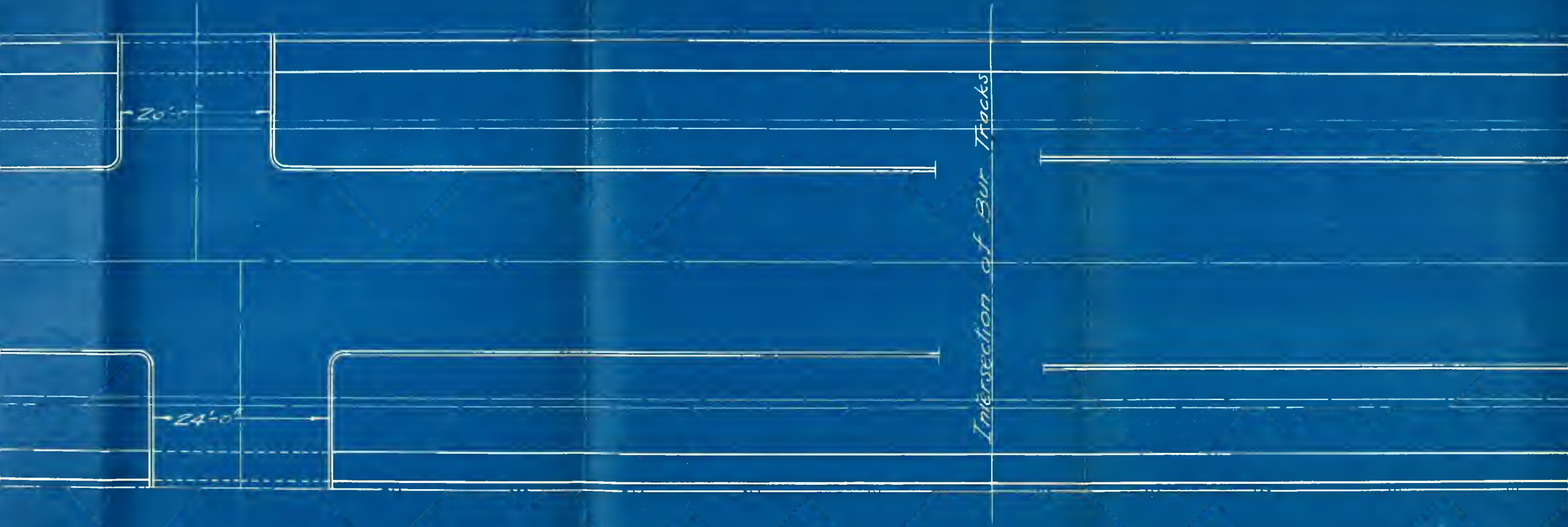

MACOMB
ROAD
10'-0"
10'-0"

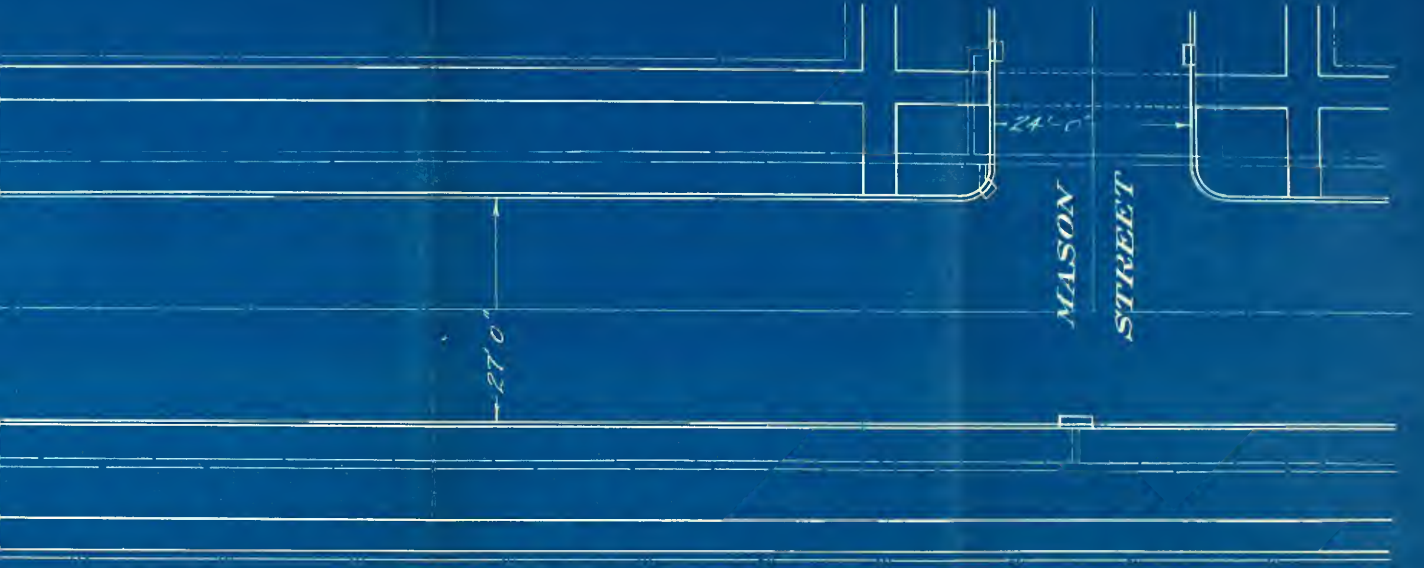

10'-0"
10'-0"
ROAD
10'-0"

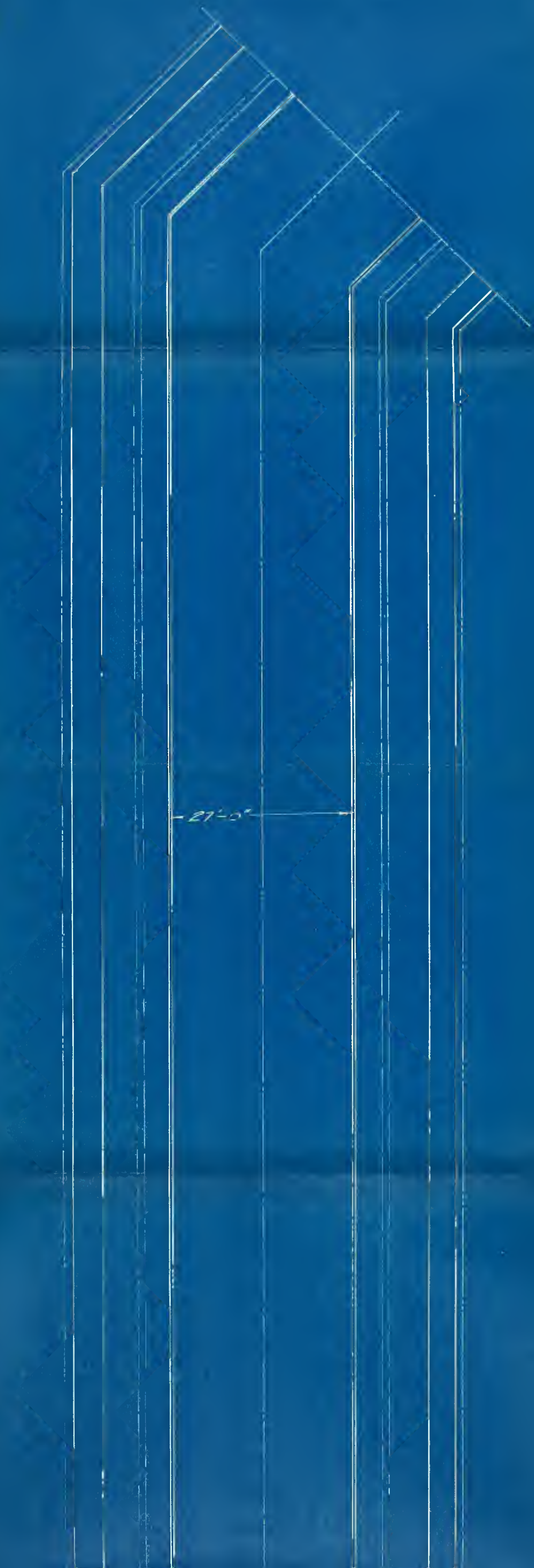

Corporate Limit
24'-0"
10'-0"

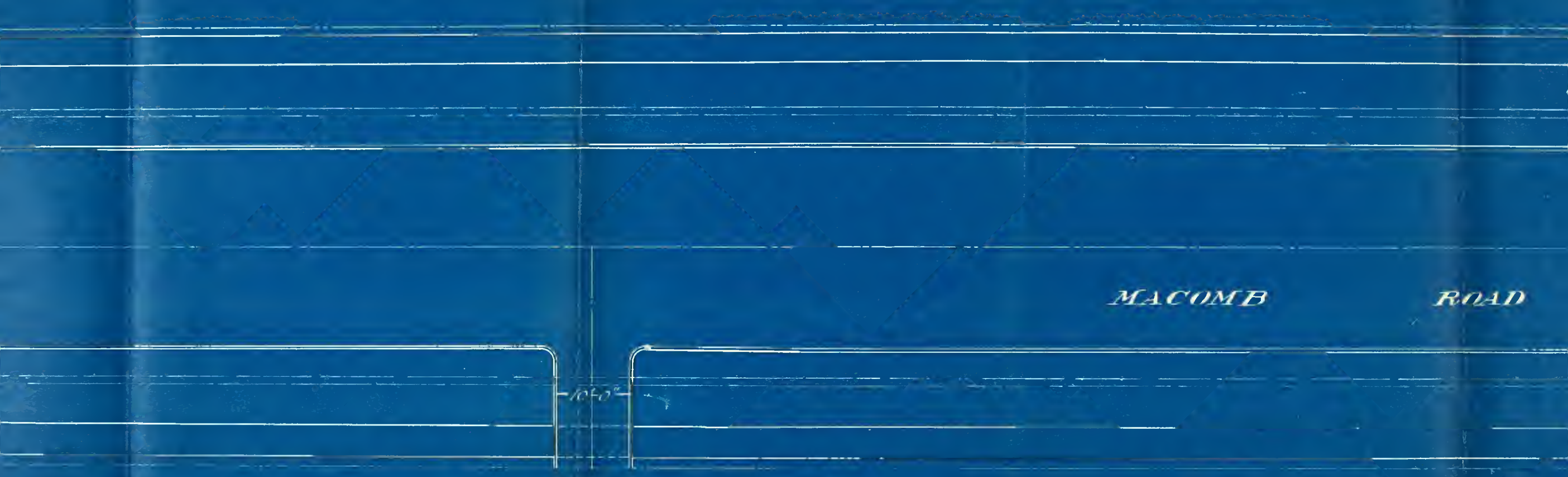

10'-0"
10'-0"
24'-0"
12'-0"

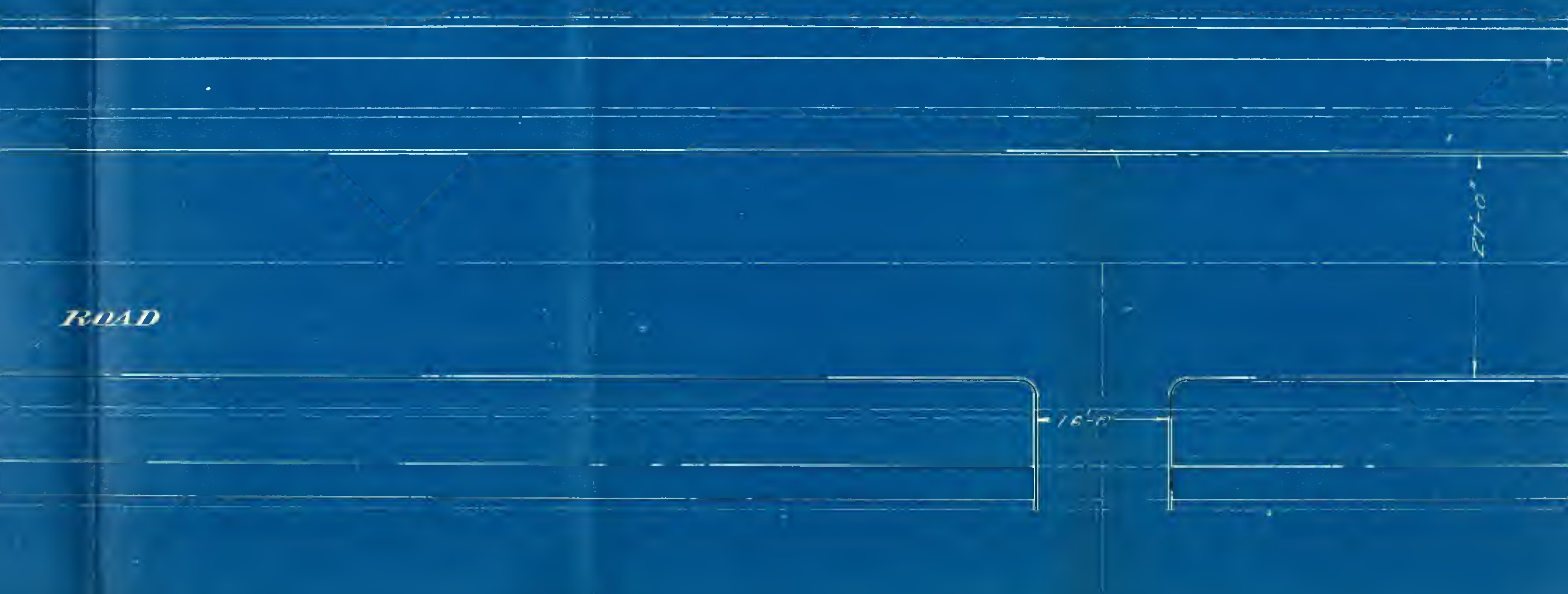

10'-0"
20'-0"
MACOMB
ROAD
20'-0"
24'-0"

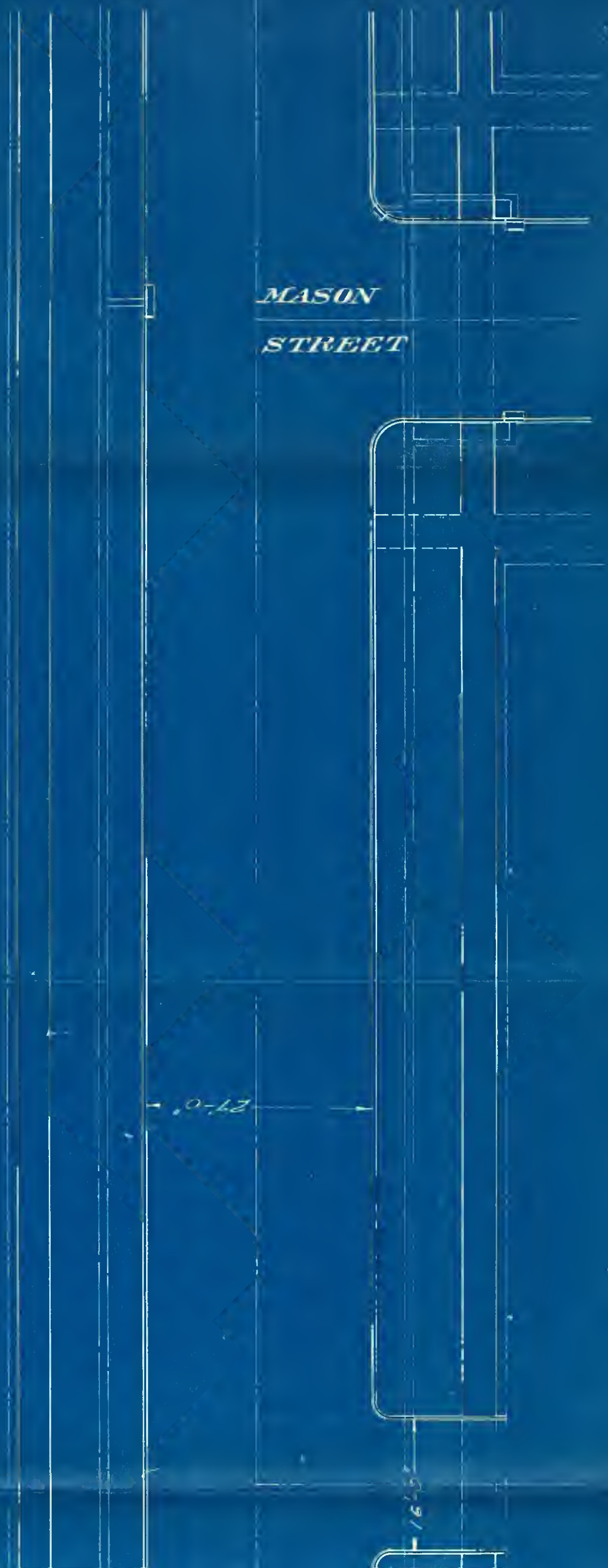

20'-0"
24'-0"
Intersection of Bur Tracks

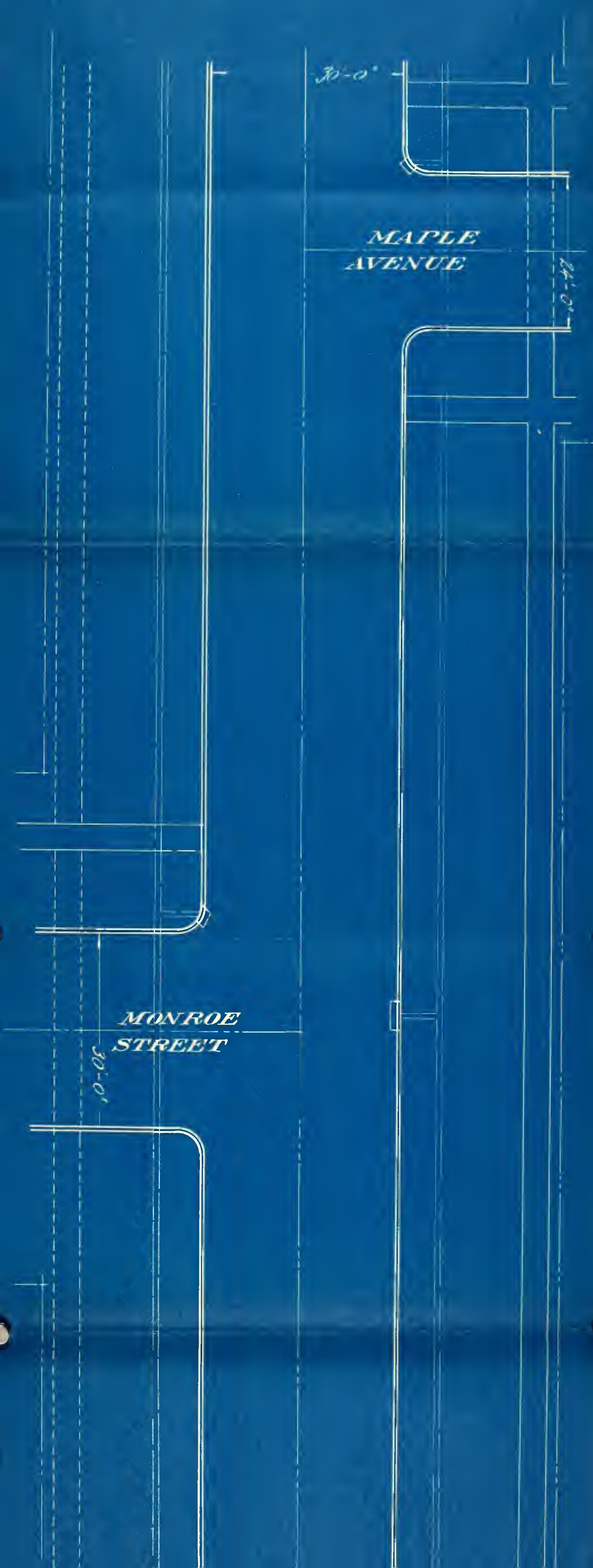

MASON STREET
24'-0"
27'0"

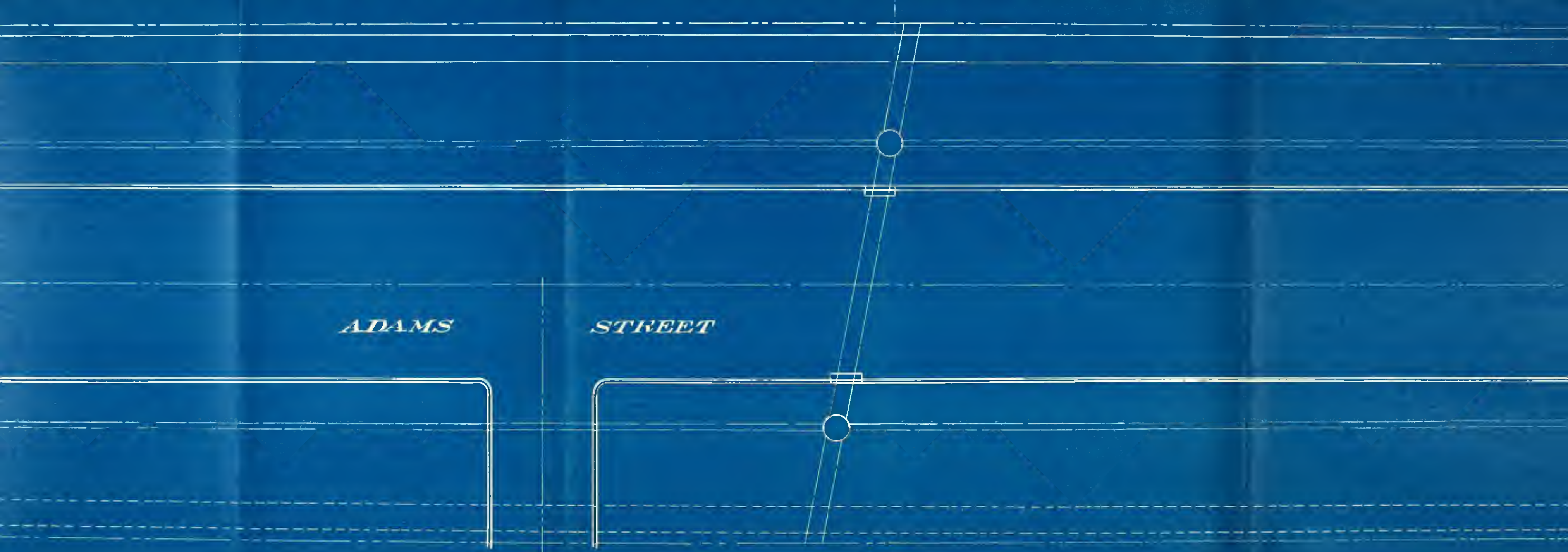

27'-0"

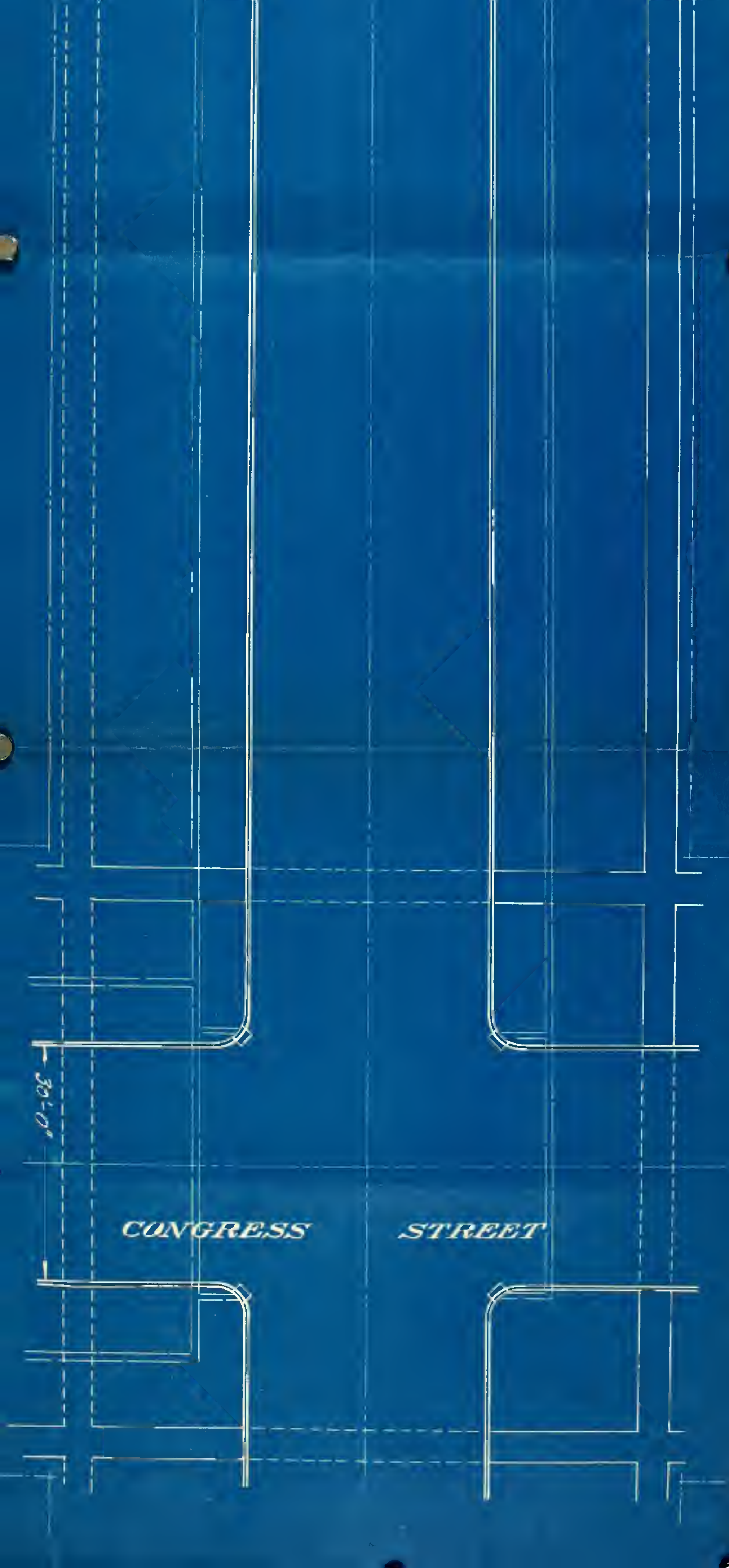

MACOMB ROAD
10'-0"

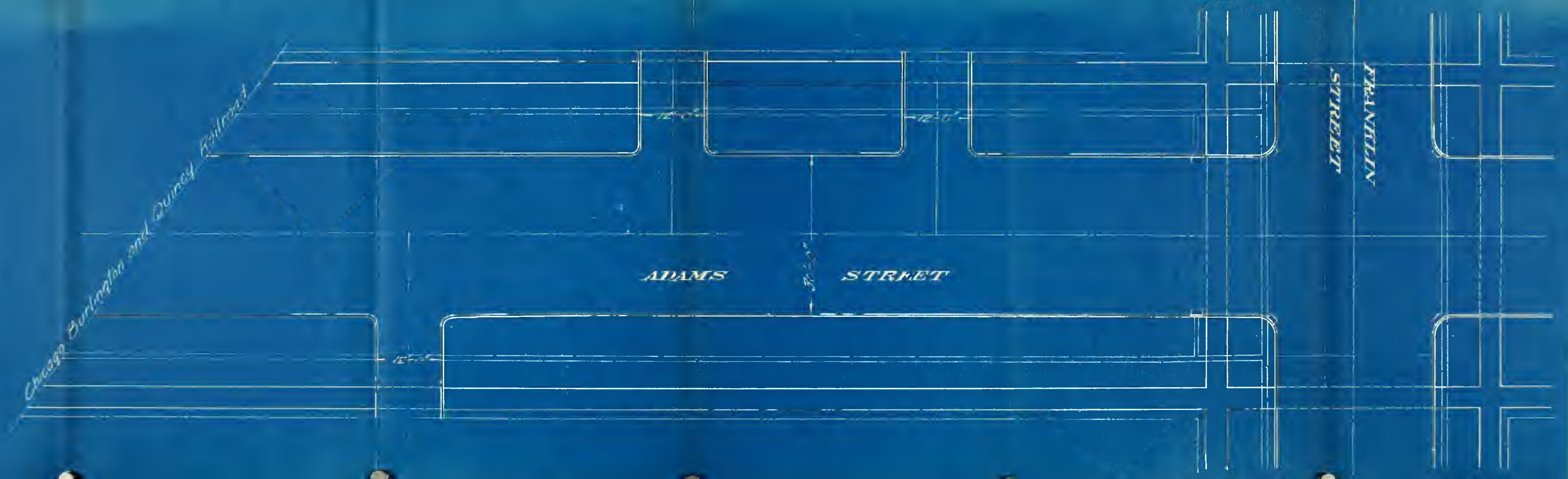

ROAD
27'-0"
16'-0"

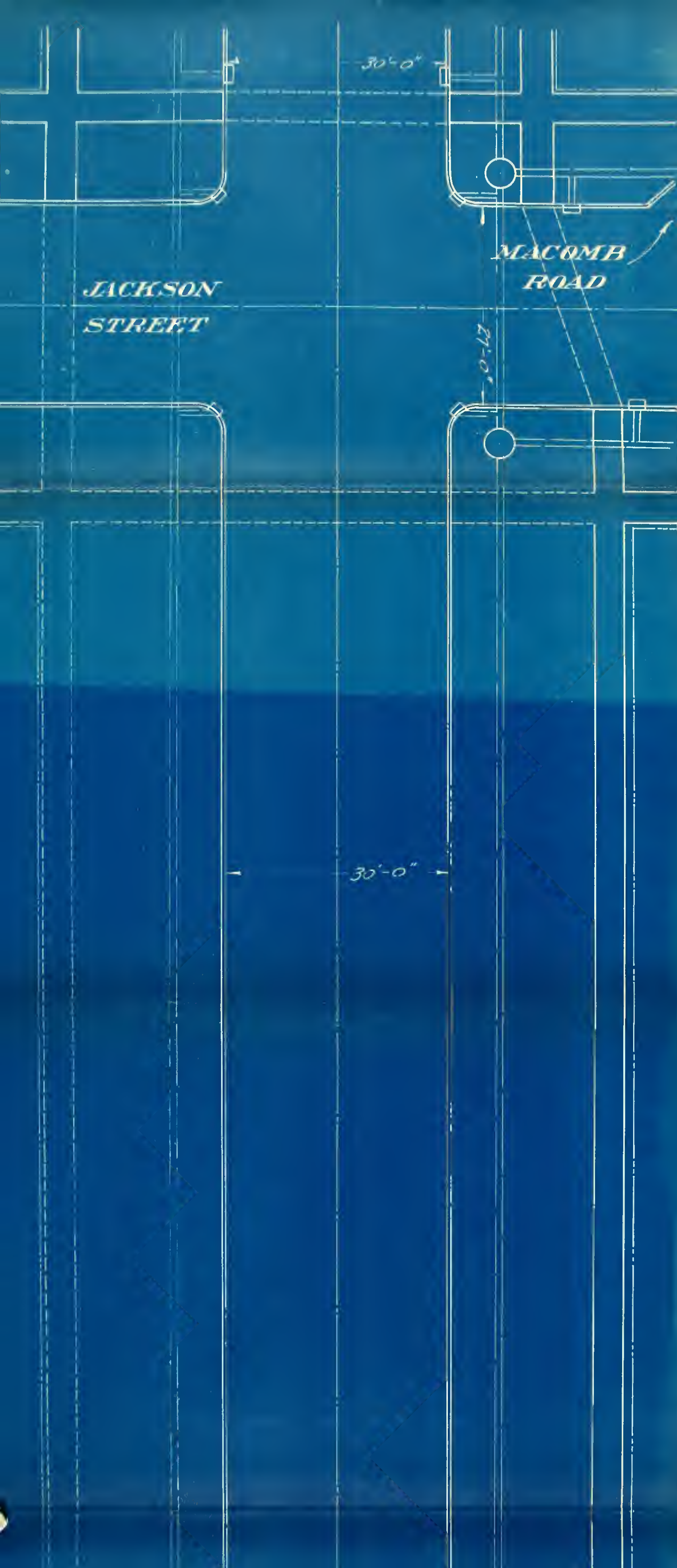

MASON
STREET
27'-0"
16'-5"

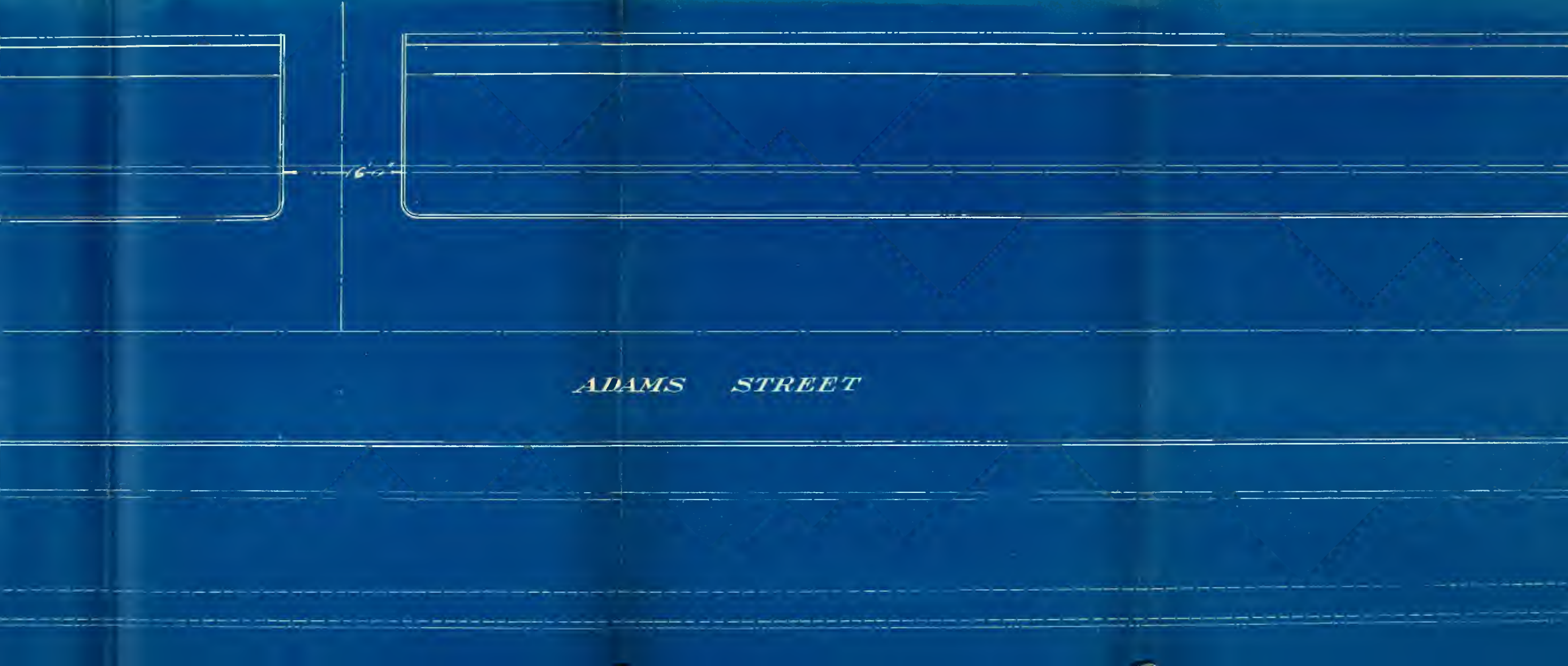

30'-0"
MAPLE
AVENUE
24'-0"
MONROE
STREET
30'-0"

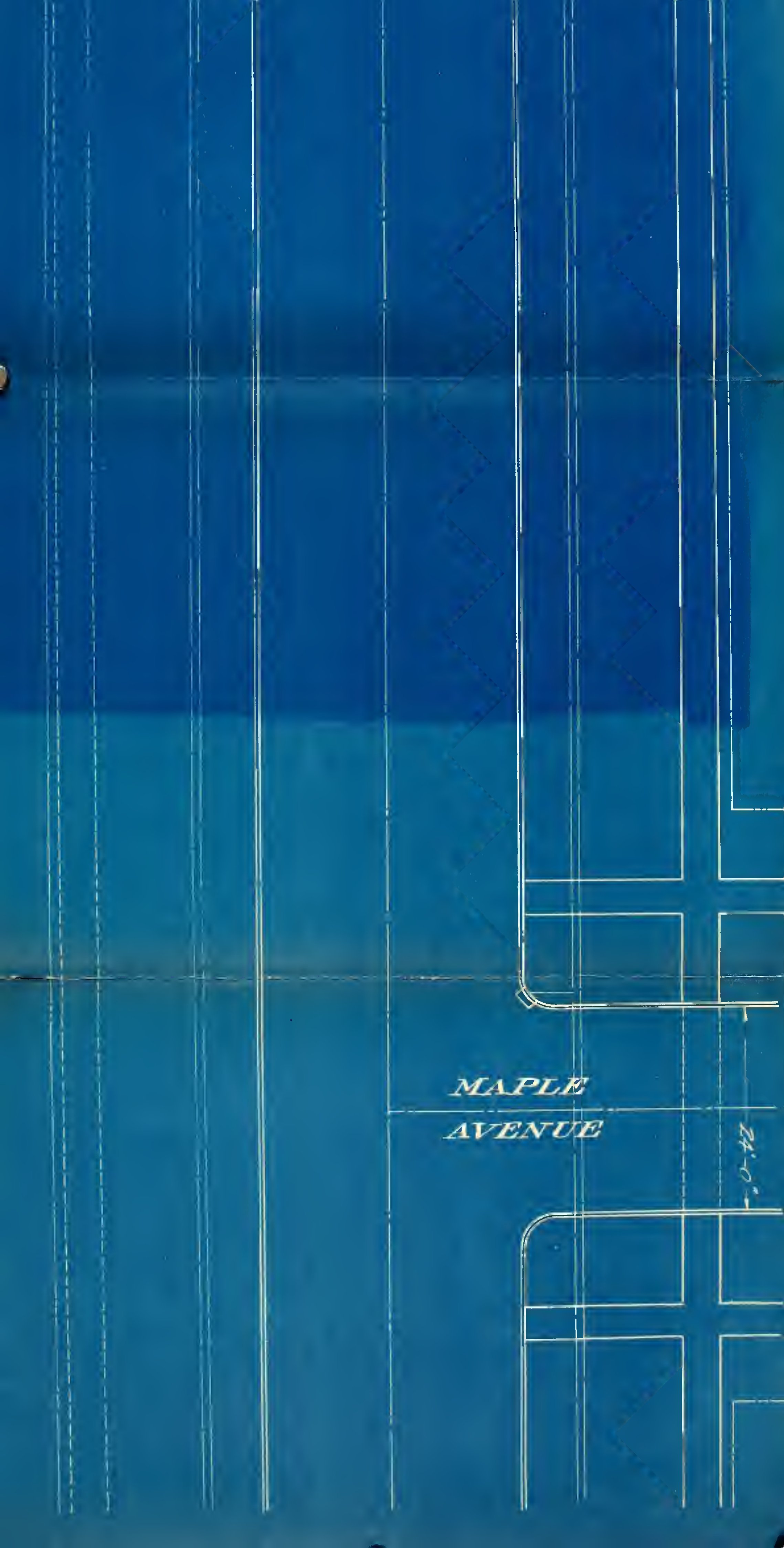

ADAMS STREET


30'-0"
CONGRESS STREET


Chicago Burlington and Quincy Railroad
12'-0"
12'-0"
ADAMS STREET
12'-0"
FRANKLIN STREET


30'-0"
JACKSON STREET
MACOMB ROAD
27'-0"
30'-0"


16'-4"
ADAMS STREET


MAPLE
AVENUE
24'-0"